Energy, Mines and Resources Canada / Energie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology / Centre canadien de la technologie des minéraux et de l'énergie

INDEX OF MINING TECHNOLOGY PROJECTS

RÉPERTOIRE DE PROJETS EN TECHNOLOGIE MINIÈRE

1986

MINERAL AND
ENERGY TECHNOLOGY

MINING RESEARCH
LABORATORIES

165 pp.

SP86-1[illegible]

INDEX OF MINING TECHNOLOGY PROJECTS

RÉPERTOIRE DE PROJETS EN TECHNOLOGIE MINIÈRE

1986

R. Clarke & P. Lacourse

Mining Methods and Evaluation Group

Groupe d'évaluation et de méthodes minières

November 1986

Novembre 1986

MICROMEDIA

[illegible] (CANMET) [illegible]

MINERAL AND ENERGY TECHNOLOGY

LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

MINING RESEARCH LABORATORIES

LABORATOIRES DE RECHERCHE MINIÈRE

SP86-12

165pp

© Minister of Supply and Services Canada 1987

Available in Canada through

Associated Bookstores
and other booksellers

or by mail from

Canadian Government Publishing Centre
Supply and Services Canada
Ottawa, Canada K1A 0S9

Catalogue No. M38-15/86-12E Canada: $16.95
ISBN 0-660-12230-8 Other Countries: $20.35

Price subject to change without notice

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the Publishing Services, Canadian Government Publishing Centre, Ottawa, Canada K1A 0S9.

FOREWORD

CANMET was requested by the mining sub-committee of the National Advisory Committee on Mining and Metallurgical Research to establish a mining technology database. The database was established in 1985 and is being updated on a continuing basis as new information is obtained. The planned periodic reports of the contents of the mining technology database, of which this is the second, provide the reader with information on projects underway in Canada to improve mining operations. CANMET's particular intent in preparing the report is to facilitate communication between mining companies and other sectors of the mining industry sharing the same problem of research interest.

Information for the database was gathered by telephone, by mail and by site visits. It is hoped, that as the value of the report becomes more evident, more organizations carrying out mining technology projects will participate in the development of the index.

In addition to identifying the source, the mining technology index contains a brief description of each project. The database was not established to provide detailed information on projects but rather to facilitate contact between parties using the index.

Section One of the report lists all projects by organization. Section Two assigns projects to one of twelve classifications. Attempting to group mining activities into twelve relatively equally weighted and distinct categories was found difficult. As a result, a number of projects appear in two categories either due to project description or to the natural relation that exists between all mining activities. Suggestion from readers on how the classification system could be improved would be appreciated and evaluated for adoption.

The usefulness of CANMET's Index of Mining Technology Projects depends on the degree of participation of the mining community in its preparation. Hopefully, with its cooperation the Index can be expanded to encompass all segments and effectively contribute to productivity improvements and cost reductions.

Finally I would like to thank all those who have contributed to the successful completion of the 1986 Index and sollicit their support, as well as the support of new contributors, in the preparation of the 1987 Index.

John E. Udd
Director
Mining Research Laboratories

AVANT-PROPOS

Le Comité consultatif national sur la recherche en génie minier a demandé à CANMET de mettre sur pied une banque de données sur la technologie minière. Celle-ci a été initiée en 1985 et est mise à jour sur une base continue au fur et à mesure que l'information est obtenue. Les rapports périodiques contiennent l'information de la banque de données et permettent au lecteur de se familiariser avec l'ensemble des projets en cours au Canada pour améliorer les opérations minières. La présente version constitue la deuxième édition. Le principal but de CANMET dans la préparation d'un tel répertoire est de faciliter les communications entre les mines et les autres intervenants de l'industrie minière.

L'information contenue dans la banque de données a été amassée par téléphone, courrier et visites aux mines. À mesure que ces rapports périodiques augmenteront leur crédibilité, de plus en plus d'organisations participeront sans doute à l'élaboration de la banque de données.

En plus d'en identifier l'origine, le répertoire en technologie minière contient un titre élaboré pour chaque projet. La banque de données n'a pas été mise en place pour donner de l'information détaillée sur les projets en cours, mais plutôt afin de faciliter les contacts entre les divers utilisateurs du répertoire.

La première section du rapport regroupe les projets par organisation. La seconde assigne les projets à l'une des douze catégories. Regrouper les activités minières en catégories relativement balançées au point de vue du nombre de projets n'est pas chose facile. Conséquemment, un bon nombre de projets apparaissent dans deux catégories à cause de leur description ou de l'interaction naturelle existant entre diverses activités minières. Les suggestions des lecteurs pour pallier à ce problème de classification seraient appréciées.

L'utilité du répertoire de projets en technologie minière de CANMET dépend du degré de participation de la communauté minière lors de sa préparation. Espérons que le répertoire prendra plus d'ampleur, afin d'englober tous les secteurs et de contribuer véritablement à des accroissements de productivité et des réductions de coûts.

En dernier lieu, je voudrais remercier tous ceux qui ont contribué à la version 1986 du répertoire et solliciter leur soutien, tout autant que celui de nouveaux participants, pour la préparation de la version 1987.

John E. Udd
Directeur
Laboratoires de recherche minière

TABLE OF CONTENTS / TABLES DES MATIÈRES

Page

Foreword . . . i
Avant-Propos . . . iii
Introduction . . . 1
Introduction . . . 2
Section One/Section Un . . . 3
Mine Operating Companies/Compagnies Minières

British Columbia and the Territories/Colombie Britannique et Territoires
Afton Operating Corporation . . . 5
Brenda Mines Ltd . . . 6
Canada Tungsten Mining Corporation Ltd . . . 7
Cominco Limited, Sullivan Mine . . . 8
Cominco Limited, Valley Copper Mine . . . 9
Lornex Mining Corporation Ltd. . . . 10
Pine Point Mines Limited . . . 11
Westmin Resources Limited, Myra Falls Operations . . . 12

Prairie Provinces/Prairies
Cigar Lake Mining Corporation . . . 13
Cominco Ltd., Vade Mine . . . 14
Hudson Bay Mining and Smelting, Flin Flon/Snow Lake Operations . . . 15
Inco Ltd., Manitoba Division . . . 16
International Minerals and Chemical Corporation (Canada) Ltd., . . . 17
Noranda Inc., Central Canada Potash . . . 18
Potash Corporation of Saskatchewan, R&D Mining Department . . . 19
Sherritt Gordon Mines Ltd, Ruttan Operation . . . 20

Ontario/Ontario
Campbell Red Lake Mines Ltd. . . . 21
Campbell Red Lake Mines Ltd., Detour Lake Mine . . . 22
Denison Mines Ltd., Elliot Lake Operations . . . 23
Dome Mines Limited . . . 24
Domtar Inc., Sifto Salt Division, Goderich Mine . . . 25
Falconbridge Ltd. . . . 26
Inco Ltd, Ontario Division . . . 28
Kidd Creek Mines Limited . . . 29

TABLE OF CONTENTS (cont) / TABLES DES MATIÈRES (suite)

Lac Minerals Ltd., Page-Williams Division 30
Noranda Inc., Lyon Lake Mines Ltd. 31
Renabie Gold Mines Ltd. 32
Rio Algom Ltd., Elliot Lake Operations 33

Quebec/Québec

Corporation Falconbridge Copper, Division Opémiska 34
Corporation Falconbridge Copper, Division Lac Shortt 35
JM Asbestos Inc., Jeffrey Mine 36
LAB Chrysotile Inc. 37
Les Explorations Muscocho Ltée, Mine Montauban 38
Les Mines D'Or Kiena Limitée 39
Les Mines Seleine Inc. 40
Les Ressources Camchib Ltée 41
Les Services TMG (NIOBEC) Inc. 42
Minerais Lac Ltée, Division Bousquet 43
Mines D'or Lac Bachelor Inc. 44
Québec Cartier Mining Company 45
Sigma Mines (Québec) Ltd 46

Atlantic Provinces/Provinces de l'Atlantique

Brunswick Mining and Smelting Corporation, Mining Division 47
Denison-Potacan Potash Company 48
Gordex Minerals Ltd. 49
Rio Algom Ltd., East Kemptville Mine 50

Universities and Colleges/Collèges et Universités

British Columbia and the Territories/Colombie Britannique et Territoires

University of British Columbia 51

Prairie Provinces/Prairies

University of Alberta 54
University of Saskatchewan 55

TABLE OF CONTENTS (cont) / TABLES DES MATIÈRES (suite)

Ontario/Ontario
- Lakehead University . . . 56
- Laurentian University . . . 57
- Queen's University . . . 59
- University of Toronto . . . 60
- University of Waterloo . . . 61

Quebec/Québec
- Collège de la region de l'amiante . . . 62
- École Polytechnique . . . 63
- McGill University . . . 65
- Université Laval . . . 68
- Université du Québec à Chicoutimi . . . 70

Atlantic Provinces/Provinces de l'Atlantique . . .
- Technical University of Nova Scotia . . . 71

Private Sector Research/Centres Privés

British Columbia and the Territories/Colombie Britannique et Territoires
- B.C. Research . . . 73
- C.A. Shook Consulting Ltd. . . . 74

Ontario/Ontario
- Dynatec Mining Limited . . . 75
- HDRK Mining Research Ltd . . . 76
- Mines Accident Prevention (MAPAO) . . . 77
- Mining Industry Research (MIROC) . . . 78
- Mining Resource Engineering Ltd. . . . 79
- C. Mirza Engineering Inc . . . 80
- J.S. Redpath Limited . . . 81
- Teledyne Canada Mining Products . . . 82
- Vadeko International Inc. . . . 83

Quebec/Québec
- Association des Mines de Métaux du Québec . . . 84
- Noranda Research Centre . . . 85

TABLE OF CONTENTS (cont) / TABLES DES MATIÈRES (suite)

Public Sector Research/Organismes du Secteur Public

Prairie Provinces/Prairies

Coal Research Laboratories / Laboratoires de recherche sur le charbon . . . 87
Manitoba Department of Energy and Mines . . . 88
Saskatchewan Research Council . . . 89

Ontario/Ontario

Mining Research Laboratories / Laboratoires de recherche minière . . . 90
Ontario Ministry of Labour . . . 94
Natural Sciences and Engineering Council / Conseil de recherche en Sciences Naturelles et Génie . . . 95

Quebec/Québec

Centre de Recherches Minérales . . . 96

Section Two/Section Deux . . . 99
Index Categories . . . 101
Categories du Répertoire . . . 103
Mine Administration/Administration . . . 105
Mine Feasibility/Faisabilité . . . 110
Surface Technology/Technologie de Surface . . . 112
Mine Design/Conception . . . 116
Equipment/Équipement . . . 120
Development/Développement . . . 126
Stoping/Minage . . . 127
Materials Handling/Manutention des Matériaux . . . 130
Mine Services/Services . . . 132
Ground Control/Soutènement . . . 138
High Tech/Technologie de Pointe . . . 147
Metal Recovery/Minéralurgie . . . 154

INTRODUCTION

Mines are often isolated from centres with universities, professional associations and other sources of new information. Many operators, because of the isolation, must work with only partial knowledge of new techniques, equipment or procedures that might be of great value to them. As a result they are forced, at times, to "re-invent the wheel". With increasing competition and softening metal demands such re-inventions are needless expenses to mine operators and to the national economy. Since relations between mines are usually cooperative CANMET was requested to establish an information system to facilitate communication between operators and other segments of the industry on technology development projects.

This report contains the results of the 1986 information gathering exercise. Some information was gathered by telephone conversations, some by mail and some by mine visits. A few of the mines contacted had no projects underway to improve their operations; some remained to be convinced that they could benefit from projects being carried out by other operators. Their response raises the question what is research and how does research differ from those operational improvements all mines strive for daily? For the purpose of the "Index" all research projects submitted have been included.

While no two mines are alike, all share many similarities. Staffs at many underground mines see the advantages in their mines changing from selective mining methods to bulk mining. At some mines complete changes can be made, at other mines, because of orebody configuration, only partial changes are possible. The major benefit of such changes are reduced cost through higher stope production rates and reduced stope development requirements. Other mines are trying to reduce costs by increasing production rates, redesigning materials handling systems, increasing mechanization and concentrating men in fewer work places. Whatever the specific circumstances, most operators are trying to incorporate some or all of these new concepts into their mine operations. This report outlines projects being undertaken by operators related to implementation of such concepts.

CANMET does not possess detailed information on projects contained in the "Index". For detailed information the user is directed to the contact persons listed for each project.

INTRODUCTION

Les mines sont souvent isolées des centres où sont concentrées universités, associations professionnelles et autres sources d'informations nouvelles. Dû à cet isolement, beaucoup d'opérations doivent oeuvrer avec des techniques, équipements ou procédures partiellement adaptés qui pourraient donc leur être plus profitables. Conséquemment, il faut de temps à autre "réinventer la roue". Avec l'accroissement de la compétition et la baisse de la demande pour les métaux, de telles réinventions constituent des frais superflus pour l'exploitant minier ainsi que pour l'économie nationale. Les mines désirant maintenir un niveau de coopération élevé, CANMET a été approché afin d'établir un système qui favoriserait les transferts d'information sur les projets de développement technologique d'un exploitant à l'autre et entre les différents secteurs de l'industrie.

Ce répertoire regroupe les résultats de la collecte d'informations de 1986 qui fut réalisée par téléphone, courrier et visites aux mines. Quelques mines contactées n'avaient pas de projets en cours pour améliorer leur exploitation; quelques autres ne purent être convaincues des bénéfices que pourraient leur apporter les projets réalisés ailleurs. Leur réponse soulève la question: qu'est-ce que la recherche et comment diffère-t-elle des améliorations opérationnelles que chaque mine doit envisager quotidiennement? Aux fins de ce répertoire, tous les projets soumis ont été inclus.

Il n'existe pas deux mines identiques, mais elles partagent toutes certaines similitudes. La direction de plusieurs mines souterraines voit l'avantage de changer d'une méthode de minage sélective à une méthode en vrac. Il est possible de modifier complètement les méthodes à certaines mines; par contre, à d'autres endroits, la configuration du gisement ne peut le permettre que partiellement. Le bénéfice principal qui découle de telles modifications provient de la réduction des coûts suite à une production accrue et une réduction des travaux de développement. D'autres mines essaient de diminuer les coûts en augmentant le taux de productivité, en modifiant les systèmes de manutention des matériaux, en augmentant la mécanisation et en réduisant le nombre de zones de travail afin de concentrer le personnel. Quelles que soient les circonstances particulières, la majorité des mines essaient d'incorporer un ou plusieurs de ces concepts à leurs opérations. Ce rapport regroupe les projets en fonction des responsables de leur déroulement.

CANMET ne possède pas d'information détaillée sur les projets inclus dans ce répertoire. Pour de plus amples informations, le lecteur devra contacter la personne responsable du projet.

SECTION ONE - Projects Listed by Organization

SECTION UN - Liste des Projets par Organisation

Afton Operating Corporation
P.O. Box 937
KAMLOOPS, BC
V2C 5N4

D. Stewart
Chief Engineer
(604) 374-5022

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Orebody evaluation - Pit optimization.	2
2. Vacuum enhanced drainage.	9

Brenda Mines Ltd
PO Box 420
Peachland, British Columbia
V0H 1X0

G.H. Blackwell, P. Eng.
Chief Mine Engineer
(604) 493-0220

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Geostatistical ore reserve modelling for diamond drill and blast hole drill assays with computer graphic and plotter displays	3
2. Complete short term planning system	9
3. Interactive short to long term open pit computer planning system with full graphics	9
4. Computerized survey slope monitoring system for transit/EDM	10
5. Computerized radio telemetry slope monitoring system for strain gauges and extensometer monitoring	10

Canada Tungsten Mining Corporation Ltd
P.O. Box 9
TUNGSTEN, NWT
XOH OAO

J.C. Devitt
Mine Manager
(403) 777-2345

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Tailings backfill dewatering.	7
2. VCR ore extraction.	7

Cominco Limited
Sullivan Mine
P.O. Box 2000
KIMBERLEY, BC
V1A 2G3

Michael Bapty
Superintendent Technical Development
(604) 427-2884

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing research on explosives and explosives technology.	7
2. Methods to stabilize permafrost.	3
3. Mechanical mining machines: shafts, raises, drifts.	5
4. Control of diesel emissions.	9
5. Introduction of fire resistant hydraulic fluids.	5, 1
6. Leaky cable underground communication system.	1
7. Underground computer terminals for shift boss reporting.	1
8. Field testing 4.5 inch and 3.5 inch in-the-hole up-hole drilling system.	7, 5
9. Develop a lift check device to lock scooptram dump and roll cylinders.	5, 1
10. Shotcrete cable bolts and applications	10
11. Cermet bit inserts for gauge buttons.	5, 11
12. Explosives customizing to give greater gap sensitivity and less power for perimeter blasting.	5, 10

Cominco Ltd.
Valley Copper Mine
P.O. Box 3070
KAMLOOPS, BC
V2C 6B7

A.F. Bellamy
Chief Mine Engineer
(604)575-2424

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rubber truck box.	5
2. Heap leaching - Solvent extraction.	12
3. Overburden dewatering.	3
4. Tailing dam construction.	3
5. Lake dewatering	3

Lornex Mining Corporation Ltd.
P.O. Box 1500
LOGAN LAKE, BC
VOK 1W0

W.K. Munro
Chief Mine Engineer
(604) 575-2443

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Scalping/Screening of mill feed.	8
2. Haulage truck fuel efficiency study.	5
3. Shovel payload weighing system.	5
4. Trolley assist truck haulage.	5
5. Computerized mine maintenance.	11, 9
6. Computer assisted truck dispatch.	11, 5
7. Rock grinding index.	12

Pine Point Mines Limited
P.O. Bag 2000
Pine Point, NWT
X0E 0W0

J.R. Greenhalgh
Mine Manager
(403) 393-2811

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Total station survey instruments interfaced with a computer system.	11
2. Use of large roadheader in room and pillar mining.	7, 8
3. 10 foot diameter bored shaft with slip cast concrete lining.	6
4. N-81 grout curtain.	3, 9

Westmin Resources Limited
Myra Falls Operations
P.O. Box 8000
CAMPBELL RIVER, BC
V9W 5E2

C. De Seta
Planning Engineer
(604) 287-9271

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Sub-level retreat mining with waste fill.	7, 10
2. Mining 30 deg. dip orebodies with trackless equipment	4, 5
3. Log-normal ore reserve calculations.	3

Cigar Lake Mining Corporation
410-224 4th Ave. South
SASKATOON, Saskatchewan
S7K 5M5

G.A. Peebles
General Manager
(306) 665-2628

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of an underground mining approach for a very high grade uranium deposit.	4

Cominco Ltd.
Vade Mine
VANSCOY, Saskatchewan
S0L 3J0

R.M. Henningson
Mine Manager
(306) 668-4343

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Field and laboratory testing, field measurements and numerical modelling of excavations in potash.	10

Hudson Bay Mining and Smelting Co. Ltd. F.P. Youngwirth
FLIN FLON/SNOW LAKE OPERATIONS
P.O. Box 1500 (204) 687-5396
FLIN FLON, Manitoba
R8A 1N9

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Bacterial-Leach assisted mining.	12
2. Tertiary recovery adjacent to unconsolidated backfill.	4
3. Mine design CADD system.	11
4. Mining method selection, blast, design and layout for flat dipping orebody.	4
5. Delayed backfill consolidation.	10

Inco Ltd.
Manitoba Division
THOMPSON, Manitoba
R8N 1P3

W.R. Niemi
Superintendent Research
(204) 677-5242

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of a geomechanical data-base and numerical model for predicting ground behavior at depth.	10
2. V.B.M. design guidelines for steeply dipping orebodies and scaling techniques.	10, 4
3. Optimization of blast design for blasthole mining operators.	7

International Minerals
and Chemical Corporation (Canada) Ltd.
Potash Division
ESTERHAZY, Saskatchewan
S0A 0X0

J.D. Kelland
President
(306) 745-3931

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Study of overburden movement and pillar behavior in extracted areas.	10
2. Seismic monitoring.	10
3. Input parameters for numerical modelling of potash strata	10, 4

Noranda Inc.
Central Canada Potash
P.O. Box 1500
COLONSAY, Saskatchewan
S0K 0Z0

Dr. A.M. Coode
Chief Mine Engineer
(306) 944-2170

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. A field test program to evaluate the use of waste salt backfill in Saskatchewan potash mines.	3

R&D Mining Department
Rocanville Division
Potash Corporation of Saskatchewan
P.O. Box 270
ROCANVILLE, Saskatchewan
SOA 3L0

W.E.G. Taylor
Manager
(306) 645-2870

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Pathways movements of brine from potash tailings piles.	3
2. Underground transport of tailings.	8
3. Optimized mineral extraction (OME) drop pipe development.	9, 5
4. Mining machine mounted analyzer for improved ore grade.	5, 9
5. Automated advance unit for continuous mining machines.	5
6. Development of a prototype microseismic monitoring system.	10
7. Ore cutting technology.	11
8. Friction and wear: Evaluation of fire resistant hydraulic fluids.	5, 9
9. Dust and fines generation in underground mining and ore handling.	1, 8
10. Alternative mine air heating using waste heat.	9
11. Mined out potash room utilization.	9
12. Development of tailings flinger.	5, 8
13. Non destructive testing of hoist ropes.	5, 1
14. Rock bolter for the PCS, Lanigan Division.	10
15. Clay sorting technology for ores with high insolubles content.	12
16. Alternative power systems for personnel transport underground.	9, 5
17. Wall rock permeability study at PCS, Rocanville Division.	9

Ruttan Operation
Sherritt Gordon Mines Ltd
P.O. Box 1000
Leaf Rapids, Manitoba
R0B 1W0

K. Ball
Manager
(204) 473-2415

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Ground stability evaluation with reference to an en echelon orebody.	10
2. Communication system for isolated areas in mines.	1, 10

Campbell Red Lake Mines Ltd.
P.O. Box 10
BALMERTOWN, Ontario
POV 1C0

M. Neumann
Chief Engineer
(807) 735-2075

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Microseismic monitoring.	10, 11
2. Sill pillar destressing.	10

Campbell Red Lake Mines Ltd.
Detour Lake Mine
130 Wilson Ave.
TIMMINS, Ontario
P4N 2S9

G. Alexa
Personnel and Support Services Supt.
(705) 245-3211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computerized drill and blast optimization.	11, 7
2. Preshear blasting with large diameter holes.	7
3. Mining sequence and blasting for grade control purposes.	7
4. Experiences with a remote fly-in mining operation.	1

Denison Mines Ltd.
Elliot Lake Operations
P.O. Box B-2600
ELLIOT LAKE, Ontario
P5A 2K2

P. Townsend
Chief Industrial Engineer
(705) 461-6138

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Continuing search for and development of low profile (6.5 feet) mining equipment.	5
2. Mining method development for extracting pillars adjacent to delayed fill stopes.	10
3. Program of large-scale underground testing of heap leaching.	12
4. Testing methods for mining, drying and conveying high grade fines recovered from sumps.	12
5. Use of consolidated fills for controlling violent pillar failures.	10

Dome Mines Limited
SOUTH PORCUPINE, Ontario
PON 1H0

R.J. Perry
General Superintendent
(705) 235-3221

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. In-situ determination of dewatered fill properties.	10
2. Liquefaction potential of dense backfill	10

Domtar Inc.
Sifto Salt Division
Goderich Mine
North Harbour Road
P.O. Box 370
GODERICH, Ontario
N7A 4C6

D. Bray
Manager, Maintenance, Planning & Eng.
(519) 524-8351

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Ground control research and testing.	10
2. Mechanical scaling.	5
3. Vacuum-blower unit.	10
4. Underground radio communications.	1

Falconbridge Ltd.
Onaping, Ontario
P0M 2R0

S. Bharti
Supt Mine Technical Services
(705) 966-3411

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Improving hole accuracy of in-the-hole drilling through use of stabilizers and better machine alignment.	4
2. Replacement of cement with slag. A plant is presently being set up at the Strathcona mill.	10
3. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling.	4
4. Pillar recovery in blasthole stopes against consolidated hydraulic fills.	4
5. Use of electric trucks for haulage.	5
6. Improvement of fill placement techniques to reduce cement content, segregation and dilution during pillar recovery.	10
7. Use of paste fills and other high modulus fills, state-of-the-art studies in progress.	10, 11
8. Use of microseismic monitoring at all the mines and linkage to a central controlroom for continuous monitoring on a 24-hour basis.	10, 11
9. Rockburst studies at Strathcona Mine jointly with CANMET and the Ontario government with emphasis on fault slip behaviour.	10
10. Development of 2-D and 3-D numerical modelling programs using the Distinct Element approach.	10, 11
11. Blast vibration monitoring in blasthole stopes when mining against backfill.	10

12. Selection and development of a geotechnical database system for ore reserve calculations. 3, 11

13. Computerized surveying systems. 9, 11

14. Computer aided design for optimum mine planning. 4, 11

15. Trials with a mechanized scaling machine and a mechanized bolter/screener. 5

16. State-of-the-art study on electronics in mining (HDRK project). 11

17. Application of a radio communication system (Montan Forschung) at Lockerby Mine. 9

18. Establishing a central control room at Strathcona for hoists and other materials handling functions. 8, 9

19. Development of a tunnelboring machine for hardrock (HDRK project). 6, 5

Inco Ltd
Ontario Division
COPPER CLIFF, Ontario
P0M 1N0

J.G. Kelly
Manager Mines Research
(705) 682-5261

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Testing of 'double-decked' crater blasting.	7
2. Microseismic monitoring.	10
3. Investigation of iron ore blast furnace slag as a binding agent for fills.	10
4. Development of a 'timberless' undercut and fill mining method.	4
5. Development of a 3-D numerical modelling system for rock mechanics.	11, 10
6. Jointly developing, with Spar Aerospace, remote controlled underground equipment to screen and bolt in recently blasted areas.	5, 11
7. Rock mass classification.	8, 7
8. High density fill.	10, 8
9. Continuous mobile ore removal system.	5, 8
10. 70 ton electric automated haulage truck.	5

Kidd Creek Mines Limited
P.O. Box 2002
TIMMINS, Ontario
P4N 7K1

T.R. Yu
Chief Engineer Mining R&D
(705) 267-2161

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Ballistic "Hang-up" clearance system for ore passes and drawpoints.	6
2. Loose rock sensing system for mechanized scaling.	5
3. Two studies for using water under pressure for mining applications: one for cutting and slotting and one for secondary breakage.	11
4. Partial replacement of portland cement in backfill.	10
5. Phase II of a project to improve underground communication.	1

Lac Minerals Ltd.
Page-Williams Division
P.O. Bag 500
Marathon, Ontario
P0T 2E0

J.L. Cluett
Chief Mine Engineer
(807) 238-1100

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Testing a 3% cement and 2% flyash mix to bind a minus 5 inch crushed rock backfill.	10
2. Installing an automated cemented crushed rock backfill system for one man control and operation.	10, 8
3. Commissioning a heat exchanger which will provide 25% of the energy needed to heat the 750,000 cfm mine ventilation air flow.	9
4. Selected a portable crusher for its low profile and compact arrangement for installation in a permanent underground crusher station.	8

Noranda Inc.
Lyon Lake Mines Ltd.
P.O. Box 190
IGNACE, Ontario
POT IT0

J. Haflidson
Mine Superintendent

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Remote scoop retrieval system.	5
2. Hydraulic backfill.	10
3. Long hole cut and fill	4, 7

Renabie Gold Mines Ltd.
Missanabie, Ontario
General Delivery
P0M 2H0

Dejan Polak
Planning & Production Supt.
(705) 234-2333

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Changing to sub-level caving from long-hole stoping below the 3100 level.	7, 4
2. Constructing an underground air receiver from a 460 foot exploration drift on the 3100 level.	9
3. Equip the No 2 Shaft hoist with a pinion brake.	9
4. Install a second drive motor to the winze hoist.	9
5. Implementation of a mine wide bonus system based on grades, metal prices, tons mined, monthly costs, metal production as well as absenteeism and safety.	1

Rio Algom Ltd.
Elliot Lake Operations
P.O. Box 1500
ELLIOT LAKE, Ontario
P5A 2K1

S.N. Muppalaneni
Superintendent Mining Services
(705) 461-4325

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Telescopic stoper leg for low stopes.	5
2. Pneumatic drill test for roof bolting.	5, 10
3. Evaluation of hydraulic rock bolt jumbos.	5, 10
4. Direct data entry by front line supervisor.	1, 11
5. Evaluation of computerized survey calculations.	9, 11
6. Low profile one boom jumbo for narrow development drifts	5, 6
7. Backhoe to clean trackless drilling faces	5, 8
8. Scoop modification for 6-way bulldozer blade	5, 8
9. Underground radio communications	1, 11
10. Low profile two boom hydraulic drill jumbo's	5
11. Raise elevators	9, 5
12. Deep level conveyor hoisting from several loading points with grizzlies and rock breakers	8
13. Containerized materials handling	8
14. Low profile roofbolting and screening platform	10
15. Inclinometer system for hydraulic drill jumbo drilling alignment	11, 9

Corporation Falconbridge Copper
Division Opémiska
C.P. 10
CHAPAIS, Québec
G0W 1H0

N.D. Tolgyesi
Directeur
(418) 745-2501

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude de faisabilité de télécommande sur Cavo 310 et 320.	5
2. Utilisation de laser pour arpentage en continu de longues galeries.	9
3. Système d'arpentage des trous de forage au diamant non sensible aux courants vagabonds.	9

Corporation Falconbridge Copper
Division Lac Shortt
C.P. 539
Chapais, Québec
G0W 1H0

Bertrand Potvin
Surintendant
(819) 753-2571

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude comparative des systèmes hydrauliques et pneumatiques sur foreuse jumbo.	5, 6

JM Asbestos Inc.
Asbestos Fibre Division
Jeffrey Mine
C.P. 1500
ASBESTOS, Québec
J1T 3N2

G. Bernard Coulombe
Mine Manager
(819) 879-5431

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Rock bolting open pit walls.	10
2. Installation and evaluation of 20 foot stressed cable bolts in pre-sheared pit walls.	10
3. Remote control of primary crusher operation.	12, 11
4. Remote surveillance of the central air and steam plant operation.	11
5. Mesure des mouvements verticaux d'un banc par nivellement hydraulique.	4
6. Remote surveillance of plant entrances.	9
7. Program to eliminate product contamination by improved housekeeping practices.	12
8. Programmable controller for packaging operation.	12
9. Étude statistique du contrôle de qualité.	12
10. Méthode statistique de contrôle de procédés.	12, 11
11. Informatisation de la conception et planification.	4, 11
12. Modélisation géostatistique d'un gisement d'amiante.	3
13. Automatisation de la lecture des inclinomètres.	11
14. Plan de la nappe phréatique entourrant le gisement.	3
15. Étude de faisabilité d'un rideau d'étanchéité pour réduire les venues d'eau.	3

LAB Chrysotile Inc.
C.P. 459
Thetford-Mines, Québec
G6G 5T5

Gaston Verreault
Vice-Président
(418) 338-7500

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Étude de productivité des opérations d'une mine à ciel ouvert en fonction de la fragmentation du roc (et du coût des explosifs).	7
2. Robotisation de l'empilage des sacs d'amiante.	11
3. Automatisation des contrôles de la ventilation et chauffage d'une mine souterraine.	11, 9
4. Étude de contrôle des ensacheuses par ordinateur.	11

Aristide Leclerc, Surintendant Opération Black Lake (418) 338-7500 ext.254

1. Sous-programme d'ordinateur (intégré au programme actuel) pour suggérer au répartiteur la destination optimale d'un camion libre dans une mine à ciel ouvert.	11, 9

Michel Labbé, Ingénieur Forage & Sautage (418) 338-7500

1. Optimisation des sautages primaires à l'aide d'un micro-ordinateur.	7

Lionel Poulin, Ingénieur en Planification (418) 338-7500

1. Design de puits optimal et planification minière par micro-ordinateur.	4, 11

Les Explorations Muscocho Ltée
Mine Montauban
C.P. 10
Montauban, Québec
G0X 1W0

F.A. Johnson
Directeur
(418) 336-2777

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Dimensionnement de piliers et chantiers.	4

Les Mines D'Or Kiena Limitée
CP 87
VAL D'OR, Québec
J9P 4N9

R. Lacerte
Ingénieur Chef
(819) 738-4031

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Scaler machine in underground mine.	5
2. Tunnel boring machine.	5, 6
3. Adhesion of floculant in mining backfill.	10, 11
4. Communication systems for underground workers.	1
5. Addition de cendres (fly ash) au remblai pour réduire la proportion de ciment.	10
6. Échangeur de chaleur entre l'entrée et la sortie de l'air de la mine.	9
7. Simulation du réseau de ventilation sur micro-ordinateur.	11, 9

Les Mines Seleine Inc.
Leslie, Grosse-Ile
CP 60, Iles-de-la-Madeleine
Québec
GOB 1K0

D.C. Gagnon
Directeur
(418) 985-2931

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock mechanics computer simulation model.	10, 11

Les Ressources Camchib Ltée
C.P. 3400
Chibougamau, Québec
G8P 2K9

Enriko Boiocchi
Directeur
(418) 748-2625

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Essai de dynamitage dans la zone S-3 en vue d'optimiser le patron.	7
2. Sélection des méthodes d'abattage en fonction de paramètres géologiques et économiques.	2, 4
3. Évaluation d'une mini chargeuse-navette électrique (80 cm de large).	5, 8

Les Services TMG (NIOBEC) Inc.
Chicoutimi Mine
3400 Chemin du Columbium
CP 70
CHICOUTIMI, Québec
G0V 1L0

M. Rodrique
Directeur
(418) 673-4694

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Amélioration du système de lumières de circulation dans les rampes	9
2. Échantillonnage des boues de forage permettant une meilleure définition des teneurs dans les chantiers.	9
3. Bavettes sur foreuses de 4.5 pouces de diamètre pour réduire le brouillard.	5
4. Détecteur de niveau de minerai dans les cheminées.	8
5. Modification des sièges et suspension sur les chargeuses-navettes et camions de halage pour prévenir les maux de dos.	5, 1
6. Entretien en continu des chemins et contrôle des venues d'eau au toit et dans le plancher.	9
7. Programme d'entretien préventif de l'équipement diésel souterrain.	5, 9

Minerais Lac Ltée
Division Bousquet
C.P. 1180
MALARTIC, Québec
J0Y 1Z0

Gilles Brousseau
Surintendant
(819) 759-3631

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Swellex bolts.	10
2. Machine à avance en continu (continuous miner).	5
3. Time study regarding long hole drill.	2
4. Évaluation et utilisation du système de laçage par câble (cable lacing) comme alternative au support par cadres d'acier.	10
5. Essai d'un système de chargement en vrac pour émulsions dans des trous de petit diamètre.	5

Mines D'or Lac Bachelor Inc.
Desmaraisville, Québec
J0Y 1H0

Benoit St-Pierre
Directeur
(819) 753-2521

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Échantillonneur systématique pour le minerai concassé à la décharge du concasseur secondaire.	12

Québec Cartier Mining Company
PORT CARTIER, Québec
G5B 2H3

R. Fournier
Director Engineering and Research
(418) 768-2274

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Means of relating drill hole cuttings from each ore block to ore reactions in the mill, to improve the predictability of concentrate grades.	3
2. Computerized system to improve concentrate feed blending (developed at McMaster University).	12, 11
3. On stream iron analysis.	12
4. Élaboration d'un modèle de gestion des stocks de concentré et boulettes au port.	8
5. Trous de drainage périphériques pour abaisser la nappe phréatique et installation de piézomètres.	3

Sigma Mines (Québec) Ltd
VAL D'OR, Québec
J9P 4N8

M.G. Tremblay
General Superintendent
(819) 825-4182

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Purchase of computer equipment as well as consistent software in mining.	11
2. In situ stress measurement in 1305-W drift.	10
3. Évaluation d'une foreuse hydraulique diézel de surface.	5
4. Fabrication d'un jumbo hydraulique électrique à petit diamètre ($1\frac{1}{2}$ à $1\frac{5}{8}$ po.) à partir de composantes déjà existantes.	5
5. Amélioration de la capacité de remblayage par addition d'un deuxième réservoir au moulin.	8

Brunswick Mining
and Smelting Corporation
Mining Division
P.O. Box 3000
BATHURST, NB
E2A 3Z8

F.W. Hermann
Senior Project Engineer
(506) 546-6671

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Implementing a modified cut and fill stoping method between the 850 and 1000 metre levels using remote controlled LHD's and filling stopes when emptied.	7, 10
2. Testing load cells on underground trucks that will produce hard copy reports of each shifts performance.	8, 11
3. Initiating a 3 year program to increase computer usage for engineering planning, drawdown, ore scheduling, ventilation, reserves, grade control and ground control.	9
4. Assessing an underground communication system which combines monitoring functions with voice and data transmission.	9
5. Promoting computer literacy/familiarity in all employees by providing them with no-interest loans for purchase of computers.	1, 11
6. Installing a backfill system to use 25% minus half inch quarried rock and 5% cement by weight.	10

Denison-Potacan Potash Company
P.O. Box 5005
SUSSEX, NB
EOE 1P0

A.H. Ludwig
Superintendent of Engineering
(506) 839-2146

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock mechanics instrumentation for an underground potash mine utilizing backfilling operations.	10
2. Use of backfill in potash mining (modelling).	10
3. Use of backfill in potash mining (laboratory and in-situ testing).	10
4. Testing a non-rotating balance rope with plastic filled valleys.	9
5. Testing plastic coated rub ropes in the service shaft.	9
6. Developing computer software for complete mine design and planning.	9
7. Designing a brine pumping system to handle the 6 to 10% moisture expected to drain from backfill.	9, 10

Gordex Minerals Ltd.
177 King Street East
P.O. Box 7071, Stn. A.
Saint John, N.B.
E2L 4S5

H.E. Pawson, P.Eng.
General Manager
(506) 633-2088

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Heap leaching gold processing successfully demonstrated and proceeding to expand to test full scale operation.	12

Rio Algom Ltd.
East Kemptville Mine
P.O. Box 6
EAST KEMPTVILLE, NS
B0W 1Y0

D. Grégoire
Mine Superintendent
(902) 761-2311

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Pay scheme of the man carrying the rate rather than the job based on training and job rotation.	1
2. Replacing slurry explosives with an AN/FO and emulsion mixture for use in wet holes.	7

University of British Columbia
Department of Mining
& Mineral Process Engineering
Forward Building
6350 Stores Road,
VANCOUVER, BC
V6T 1W5

Dr. G.W. Poling
Head
(604) 228-3981

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE

C. Brawner

1. Linkage algorithm for finite element/boundary integral methods for specific rock mechanics and underground mining applications.	10
2. Pillar strengthening with grouted untensioned rebar or bolts.	10

Dr. A.E. Hall

1. Recirculation of mine ventilation in order to decrease heating costs.	9
2. Coal blending computer model for improved mine planning.	12
3. Ventilation modelling to evaluate efficiency of present Nkana Division, Zambia, ventilation system and cooling practices.	9,11
4. Examination of sulphide dust explosions in Canadian mines.	1, 9
5. Development of new sampling strategies to improve the measurement of dust levels in asbestos mines.	1, 9
6. Development of a file of mine planning computer models compatible with the IBM-PC.	9
7. Research on ceramic filters and their use underground to clean diesel exhaust.	9, 5

P.D. Lawrence
Department of Electrical Engineering

1. Telerobot interfaces for machines operation. 11

Dr. H.D.S Miller

1. Underground rock mechanics investigation at McLellan Mine. 10, 4
2. Study of existing mine workings at the Ruttan Mine in order to define adequate criteria for the design of excavations. 10, 4
3. Development of a rock mechanics model for potash. 10, 4
4. Application of rock mechanics methods for the design of underground mines. 10, 4
5. Tunnel simulation using micro computers. 8, 6
6. Analysis of in-pit crushing and conveying in open pit mines as alternative to conventional truck/ shovel system. 8
7. Shear failures during rockbursting. 10

A.L. Mular

1. Computer program for estimating capital & operating costs. 2

Rimas Pakalnis

1. Estimation of optimum stope span dimensions given its rock quality, stress configuration and excavation method and rate. 4

Dr. A.J. Reed

1. Application of geostatistics to ore reserve estimations at the Venus Mine, Yukon Territory 3

2. Universal kriging applied to mineral commodity price forecasting. 2

3. Cone penetration test parameters to evaluate the stability of sand tailings impoundments. 3

University of Alberta
Department of Mining,
Metallurgical and Petroleum Engineering
606 Chemical-Mineral Engineering Bldg.
EDMONTON, Alberta
T6G 2G6

Dr. K. Barron
Professor
(403) 432-3810

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Outbursts in coal mines.	10
2. Design criteria for pillars in coal mines.	4

J.D. Scott
Department of Civil Engineering

1. Core sampler for oil sands and heavy oil formations.	3

University of Saskatchewan
Department of Geological Sciences
SASKATOON, Saskatchewan
S7N 0W0

Dr. Malcolm Reeves
Professor, Geological Engineering
(306) 966-5703

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Microcomputer applications study.	11
2. Salt tailings study (regarding backfill).	3

D.J. Gendzwill

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Natural and induced seismicity in Saskatchewan.	10

Lakehead University
School of Engineering
Oliver Road
THUNDER BAY, Ontario
P7B 5E1

Dr. J.G. Locker
Director
(807) 345-2121

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Processes for obtaining environmentally safe uranium mill tailings.	3,12

Henry North

1. Low frequency cavitation processing.	11

Dennis Roddy

1. Sub-surface radar data analysis.	11

Laurentian University
School of Engineering
Ramsey Lake Road
Sudbury, Ontario
P3E 2C6

Dr. D.E. Goldsack
Dean
(705) 675-1151

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Establishment of lighting standards and measuring techniques as they relate to ground control and emergency preparedness.	10
2. Mechanics of interaction between pillar yield and roof sag.	4
3. Numerical modelling of radiation damping in the dynamic analysis of stresses around underground openings by using the finite element method.	10,11
4. Classification of mine workings according to their rockburst proneness.	10
5. Assessment of the cuttability of hard rocks.	7
6. Processing of mill tailings for disposal and for the recovery of valuable minerals by means of flocculation, carrier flotation and electroflotation.	12, 3
7. Sulphide dust explosions: a fine particule approach.	1
8. A method and computer algorithm for isolation and calculation of the real rate of return.	2

Department of Biology

1. Studies of the bacterium thiobacillus ferrooxidans with regard to the bioleaching of uranium ores.	12
2. Movement of Ra and other radioNuclides through terrestrial and aquatic ecosystems associated with uranium mine tailings, with special reference to mammals.	3

3. Effects of revegetation practice on stream and groundwater chemistry. 3

4. Nitrògen fixation and dynamics on revegetated land. 3

5. Mechanisms for detoxifying acid, metal-contaminated soils. 3

6. Metal tolerance of plants colonizing acid, metal-contaminated soils. 3

7. Vegetation dynamics on revegetated land. 3

Department of Chemistry

1. Analysis of the pollutants generated by the diesels in underground mines. 1

2. Chemo-abrasive water jet cutting of rocks. 5,11

Department of Physics and Astronomy

1. Fragmentation of Sudbury hardrock by sonic and ultrasonic resonances. 11

2. Characterization of rock drilling debris by acoustic emission analysis in order to monitor advance parameters. 7,11

3. Size characterization of asbestos fibers using light scattering techniques. 3

4. A study of crack propagation in homogeneous and heterogeneous media - the fractal structure of porous bodies. 10

5. Penetrating dust through respirators. 1

6. Automated procedures for characterizing respirable dust. 1

Queen's University
Department of Mining Engineering
Goodwin Hall
KINGSTON, Ontario
K7L 3N6

Peter Calder
Head
(613) 545-2196

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Precursor effects to rock failure.	10
2. Self instructing teaching package for the design and application of perimeter blasting in open pit mines.	7, 1
A. Bauer	
1. Fragmentation control through blasting	7, 9
Dr. David Farahmand	
1. Boundary element method applied to underground stability analysis	10
Dr. K.R. Notley	
1. Computer applications in underground mine design	9, 11
Kenneth C. Wilson Department of Civil Engineering	
1. Improvement of the suspended-load component of the layered mechanistic slurry pipeline model using data for Western Canada coals and materials suitable for mine backfilling	11,10
R.P. Young Department of Geological Sciences and Physics	
1. Rock burst investigations using concurrent tomographic imaging and acoustic emission techniques.	10,11

University of Toronto
Department of Civil Engineering
Toronto, Ontario
M51A1

Dr. A.M. Crawford
Professor
(416) 978-3115

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. The effectiveness of mine backfill in alleviating rockburst phenomena	10

University of Waterloo
Department of Earth Sciences
Waterloo, Ontario
N2L 3G1

Dr. Maurice B. Dusseault
Prof. of Geological Engineering
(519) 888-4590

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Behaviour of halite tailings as backfill	10

Dr. John A. Franklin

1. Digital photoanalysis of rock jointing.	10,11

M. Vidyasagar
Department of Electrical Engineering

1. Adaptive control of robots vision for robots.	11
2. Salt rock geomechanics for mine design.	4

Collège de la région de l'amiante
Centre spécialisé en
technologie minérale
671, boul. Smith sud
Thetford-Mines, QC
G6G 1N1

Réjean Nadeau
Directeur
(418) 338-8591

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Ensemencement des haldes minières à l'aide des boues d'une usine d'épuration.	3
2. Optimisation des circuits de production de la fibre d'amiante.	11,12

École Polytechnique
Département de Génie Minéral
2500 Rue de la Polytechnique
C.P. 6079 Succursale A
Montréal, Québec
H3C 3A7

P.B. Dubé

(514) 340-4555

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
A. Piché (514) 340-4428	
1. Mise au point d'un système de télécommande en vue de l'opération de l'équipement minier souterrain sans visibilité du site de travail.	11, 5
2. Automatisation de l'opération d'un brise-roches par rétroaction visuelle.	11, 5
3. Prévision des coûts de forage pour les exploitations minières souterraines.	2, 4
F. Soumis (514) 340-4515	
1. Cédulation quotidienne des pelles à opérer par programmation linéaire.	9
2. Planification de la production des pelles par programmation non-linéaire.	9
Dr. J. Elbrond (514) 340-4923	
1. Modélisation de la productivité d'une machine seule, de l'interaction homme-machine et d'un système de machines.	1
2. Perte de minerai et dilution par des stériles.	7
3. Optimisation des contours des exploitations a ciel ouvert.	4

4. Modélisation CAO des méthodes d'abattage pour simuler dilution et pertes de minerai. 7, 11

Denis Gill (514) 340-4220

1. Effet de l'historique de chargement avec la méthode convergence-confinement. 10

2. Essais de poinçonnement des parois latérales des trous de sonde. 4

3. Détermination des propriétés du sel gemme par essais dilatométriques. 4

4. Programme d'éléments finis pour la conception des mines. 4

5. Évaluation du potentiel de coups de toît d'une mine. 4

6. Prévision des effets de l'utilisation des rejets de sel comme matériau de remblayage sur l'affaissement de surface des mines de sel domal. 10, 4

7. Évaluation du potentiel du vérin Goodman dans les massifs élastoviscoplastiques. 4, 5

8. Analyse de stabilité de piliers de surface. 4, 10

9. Adaptation de la technique du "Doorstopper" modifiée aux massifs de roches hétérogènes élastoviscoplastiques. 4

McGill University
Dept. of Mining and
Metallurgical Engineering
3480 University Street
Montreal, Quebec
H3A 2A7

Dr. M. Scoble
Director, Mining Program
(514) 392-5427

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mine backfill design and performance.	10
2. Automated drill monitoring.	5,11
3. Development of a simulator to assess alternative mining strategy selection on ground control and economic performance.	4,11
4. De-stress blasting design.	10

M.L. Bilodeau

1. Development of micro computer software to evaluate new mine investment proposals.	2,11
2. Optimization of mine development and operating variables.	2,11
3. Risk analysis in mining investments.	2,11
4. Simulation of mine operating decisions.	1, 2

F.P. Hassani

1. Rock-support interaction studies. 6,10

2. Development of new pack material for coal mines. 10

3. Acoustic emission technology applied to mining. 10,11

4. Stability of gate roadways in underground coal mines. 4,10

5. Paste backfill characteristics. 10

Y. Lizotte

1. A semi-automated truck dispatching system. 8,11

2. Optimization of underground mine design. 4,11

3. Simulation of underground haulage. 8,11

4. Computerized open pit design. 4,11

Dr. Neil Rowlands

1. Quantification of mineral liberation using automated image analysis. 12

R. MacLachlan

1. Blast fragmentation studies. 7

2. Ultrasonic surveying for improved drilling and blasting practices. 7

Université Laval
Faculté Des Sciences et de Génie
Département de Mines et Métallurgie
Cité Universitaire
SAINTE-FOY, Québec
G1K 7P4

Pierre Choquet
Professeur Génie Minier
(418) 656-5273

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Guidelines for the use of rockbolting.	10
2. Mesure de la tension dans les câbles d'ancrage	10
3. Back analysis of a major underground ground failure.	10
4. Étude du soutirage des blocs minéralisés aux niveaux 16 et 18 de la mine Malartic pour Les Mines Camflo Ltée.	7
5. Dimensionnement des revêtements de béton des galeries souterraines.	10
6. Prévision de la rupture par basculement en stabilité des pentes.	10, 4
7. Optimisation du soutirage dans les chantiers miniers souterrains.	7, 8
8. Logiciel de calcul de contrainte dans les massifs rocheux fracturés.	10, 4

Jean-Luc Collins (418) 656-2431

1. Influence de la prime au rendement sur les accidents du travail dans les mines souterraines du Québec.	1
2. Influence de diverses variables, dont la prime au rendement, sur la productivité minière souterraine au Québec.	1, 2
3. Création d'une station CAO/FAO.	4,11

4. Simulation de l'abattage par sous-niveaux 4,11

Kostas Fytas (418) 656-5057

1. Comparaison entre deux méthodes d'analyse informatisée des réseaux de ventilation, notamment la méthode conventionnelle et la méthode thermodynamique. 9

Université du Québec à Chicoutimi
Centre D'études
sur les Ressources Minérales
555 Boul. Université
CHICOUTIMI, Québec
G7H 2B1

Dr. G. Archambault
Directeur
(418) 545-5011

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Les études géotechniques de diverse natures sur les sols, les roches et les bétons.	10
2. Les expertises en géophysique appliquée et études séismiques.	10
3. Les analyses par différentes méthodes pour le contrôle des teneurs de minerais.	9
4. Simulation de zones de cisaillement par méthode statistique, éléments finis et modèle physique.	10

Minerals Engineering Office
Technical University of Nova Scotia
P.O. Box 1000
Halifax, Nova Scotia
B3J 2X4

Dr. L.A. Adorján
Professor and Director
(902) 429-8300

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Treatment of Pine Brook barite to obtain mud grade barite concentrate.	12
2. A study of pyrite liberation, of Prince Coal, by grinding in closed circuit with a classifier.	12

H.A. Hancock

1. Investigation into cementatious properties of lead blast furnace slag.	10

Frank A. Jerabek

1. Blasthole cleaning and dewatering apparatus.	5, 9
2. Conceptual design of rock stabilizer and outline of testing procedure.	10
3. Conceptual design of new stoping method and mechanization of stoping operations.	5, 7
4. Conceptual design of a new method of achieving rigidity of ventilation duct after installation.	9, 1

D.S. Jones

1. Evaluation of grout filled lightweight tubular steel as an alternative to conventional steel supports in mines.	10

M.C. Rockwell

1. Preliminary investigation of upgrading Nova Scotia oil shale. 12

H.G. Sherwood

1. The application of geostatistics to the Sydney coal field 3

B.C. Research
3650 Westbrook Mall
VANCOUVER, BC
V65 2L2

Dr. J. Leach
Head Environmental Health
(604) 224-4331

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Determination of concentrations and size-fractionate airborne dust particles using area or personal sampling devices.	1
2. Determination of gas concentrations on-site, using sensitive continuous monitoring techniques.	1,5
3. Recommendation of safe chemical handling practices.	1
4. Provision of education workshops in chemical handling, industrial hygiene and toxicology.	1
5. Advice on correct respirator types. Assistance in respiratory projects, on program set-up and operations.	1
6. Measurement of the permeability of protective clothing and making recommendations for specific chemical-handling applications.	1
7. Size-fractionate counting and identification of biological contaminants, such as mould and bacteria, in the workplace atmosphere.	1

Dr. R.W. Lawrence
Division of Extractive Metallurgy

1. Development of bacterial leaching pretreatment process for refractory gold ores and concentrates.	12
2. Recovery of gold from pyritic and arsenopyritic tailings.	12

C.A. Shook Consulting Ltd
306 Albert Ave
Saskatoon, Saskatchewan
S7N 1G1

Dr. C.A. Shook

(306) 343-2952

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Study of flow conditions arising in horizontal coarse slurry short distance pipelining.	4, 8

Dynatec Mining Limited
10720 Yonge St
P.O. Box 267
Richmond Hill, Ontario
L4C 3C9

John Scott P.Eng
Manager of Engineering
(416) 883-4022

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Computer program for estimating operating costs for underground mines.	2

HDRK Mining Research Ltd.
12 Park Street
P.O. Box 760
COPPER CLIFF, Ontario
P0M 1N0

M. Jowsey
Director of Research
(705) 682-0393

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Studies pertaining to continuous mining, including the use of ore sorters in conjunction with continuous breakage of rock.	5,8
2. Studies to improve productivity in raise boring.	6
3. Development of technologies, techniques and equipment for the cutting of hardrock, utilizing high pressure water jets with other relevant devices.	11

The Mines Accident Prevention
Association of Ontario (MAPAO)
P.O. Box 1468
NORTH BAY, Ontario
P1B 8K6

W.K. Coughlan
Executive Director
(705) 472-4140

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. A mine lighting study to recommend types and spacing of lights for various underground mine situations.	9
2. Maintenance of a ventilation advisory service to Ontario mines.	9

The Mining Industry
Research Organization of Canada (MIROC)
Commerce Court West, Suite 3350
P.O. Box 33
TORONTO, Ontario
M5L 1B3

R.D. Lord
Research Director
(416) 862-1417

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development and ultimate field testing of a new concept for underground radio communications.	1
2. Consideration of the development and testing of a new concept for air-powered space lighting underground.	9
3. Development of a miner's air-flow helmet, featuring dust protection and incorporating a new lamp.	1,5
4. Development of a miner's worksuit, with a comfortable water-resistant fabric.	1
5. Development of a lighter and more protective workboot than previously available.	1
6. Development of a system for monitoring mine ventilation.	9
7. Development and field testing of a 12-volt mini halogen cap lamp.	5

Mining Resource Engineering Ltd
8 Princess St
Kingston, Ontario
K7L 1A2

Dr. W.A. Crosby
Manager of Engineering
(613) 546-4089

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Preparation of computer program specifications for the mining industry.	11,9
2. Theoretical model for predicting low velocity impact sensitivity bubble of sensitized slurry explosion.	7, 11
3. Experimental verification of high velocity impact model for slurry explosives projectile impact.	7
4. Evaluation of propagation sensitivity of commercial explosives in 15 centimetre diameter holes.	7
5. Computer blast design program evaluation for large diameter blasthole stopes.	7, 11

C. Mirza Engineering Inc
Suite 410
170 Donway West
Don Mills, Ontario
M3C 2G3

C. Mirza
President
(416) 441-2560

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Sampling, field testing and modelling Les Mines Selbaie surface crown pillar.	10

J.S. Redpath Limited
P.O. Box 810
710 McKeown Avenue
North Bay, Ontario
P1B 8K1

W.K. Seidler
Vice President, Engineering
(705) 474-2461

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Estimating the capital and operating costs of mining small mineral deposits by underground methods.	2
2. Redpath/Robbins shaft boring machine for boring shafts of 6 m to 7.3 m in diameter.	6,5
3. Tunnel boring machine for boring tunnels of 2 m to 2.5 m in diameter.	6,5
4. Winder-Tensioner device for installing and tensioning hoist ropes.	5

Teledyne Canada Mining Products
P.O. Box 130
Thornbury, Ontario
N0H 2P0

B. Pal
President
(519) 599-2015

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Determination of the technical viability of cavitating impact.	5, 11

Vadeko International Inc
6535 Mill Creek Dr
Unit 62
Mississauga, Ontario
L5N 2M2

Z. Hershtal
Vice President
(416) 821-3222

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development, construction and testing of prototype accessories for automation of DTH drills.	5, 11

Association Des Mines
de Métaux Du Québec
2 Place Québec
Suite 704
QUÉBEC, Québec
G1R 2B5

Dr. C. Drouin
Directeur Services Techniques
(418) 525-4706

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Supervisory training.	1
2. Relation between bonus and accident frequency.	1
3. Design of crown pillars.	4
4. Creation of an associate research commitee to maintain contacts with different research centres.	1
5. Influence des facteurs organisationnels sur la sécurité du travail.	1
6. Impact de divers paramètres quantifiables sur la productivité en souterrain.	1
7. Évaluation de la formation continue sur la sécurité en souterrain.	1
8. Influence de l'entraînement des mineurs lors de changement de tâche sur la prévention d'accidents.	1
9. Procédures de boulonnage.	10
10. Procédures d'écaillage et analyse d'impact en prévention d'accidents.	1,7

Noranda Inc.
Noranda Research Centre
Mining Technology Division
240 Hymus Boulevard
POINTE CLAIRE, Québec
H9R 1G5

J. Nantel
Head
(514) 697-6640

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Optimization of underground stope blast design.	7
2. Study of the in-situ mining of copper oxide ore by leaching methods.	12
3. Final stage of the development and testing of an ultra sonic survey probe for determining the contours of inaccessible open stopes or other mine openings.	10, 11
4. Development of novel Ground monitoring instrumentation: i) Recoverable Stressmeter; ii) Holographic stressmeter; iii) Closure meter.	11
5. Develop new mining methods with the main objectives of reducing or eliminating the cyclic elements of mining	4, 11
6. Develop additional software modules to increase the usefulness of the "Computer-Aided Mine Design Layout System".	11
7. Development of a rock mechanics ground control field data base for use in mine design and modelling techniques.	10
8. Construction of state-of-the-art microseismic system.	11
9. Conduct subsidence studies in potash mining areas.	3, 10
10. Backfill studies of potash mines.	10
11. Development of a continuous mining machine for hard rock formations.	11,5

12. Develop numerical modelling for mine design; primarily finite element methods and boundary element techniques will be used. 10, 11

13. Prefeasibility study for the replacement of diesel fuel by hydrogen fuel in underground equipment. 11

Coal Research Laboratories
CANMET
Energy Mines and Resources
P.O. Bag 1280
Devon, Alberta
T0C 1E0

Dr. T.D. Brown
Director
(403) 987-8211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of an underground mine monitoring system.	1, 9
2. A strategy for measuring off-highway rolling resistance.	5
3. Truck management systems review.	5
4. Developments in coal mine fire control.	1
5. Off-highway truck selection in surface coal mining.	5
6. Alternative face cutting systems for longwall mining.	5
7. A suggested method for estimating bolt lengths and loadings for support of rectangular openings.	10
8. Development and validation of the truck and shovel computer model.	5
9. Productivity and equipment selection in surface mining of oil sands.	5

Manitoba Department of Energy and Mines
Mines Branch
555-330 Graham Avenue
WINNIPEG, Manitoba
R3C 4E3

D.C. Cook
Project Coordinator
(204) 945-0491

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Overburden stabilization.	3
2. Secondary recovery of base metals by in place bacterial leaching.	12
3. Underground computer assisted design.	4, 11
4. Mine air/waste waste heat recovery.	9
5. Mining recording computerization.	11

Saskatchewan Research Council
Resources Processing
30 Campus Drive
SASKATOON, Sakatchewan
S7N 0X1

J.T. Jones
Research Specialist
(306) 933-5874

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Potash rock mechanics instrumentation.	10
2. Large sample triaxial test facility.	10

Mining Research Laboratories
CANMET
Energy, Mines and Resources
555 Booth Street
Ottawa, Ontario
K1A 0G1

Dr. J. Udd
Director
(613) 996-4570

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Elliot Lake Lab	
1. Investigating mine stability and rock burst activity in mines and study the affect on computer models of alternate mine layouts and extraction rates.	10
2. Evaluate the quality and quantity of repirable dust produced in various mining activities; determine the magnitude and sources of noise and vibrations and monitoring techniques and identification of major sources of radiation and factors affecting the radiation release.	1
3. Developing methods to treat, dispose of and stabilize inactive tailings piles.	3
Explosives Atmospheres Lab	
1. Certify flameproof equipment, gas detectors and fire-resistant materials used in explosive atmospheres.	1
2. Demonstrate diesel emission control devices in both the lab and underground.	1,5
3. Evaluate, in the lab, sensors for the continuous monitoring/detection of methane, diesel contaminant, ventilation and spontaneous combustion	1
Explosives Research Lab	
1. Confirm safety characteristics of all explosives; provide technical advice on explosive manufacture, storage and transport and investigate accidents.	1

2. Verifying proposed United Nations classification procedures for incorporation into the Explosives Act and Regulations. 1

Rock Mechanics Lab

1. Developing a handbook for the safe and economic design of surface crown pillars. 4,10

2. Developing rock bolting guidelines based on the latest tecnological data and analytical results. 10

3. Carry out analytical numerical modelling studies as part of applied ground control investigations. 10,11

4. Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high level radioactive waste containment. 3

5. Testing a side-viewing television camera for use in small diameter drill holes. 11

6. Develop new ore reserve evaluation methodologies and the ore reserves of specific mineral deposits. 3

7. Supporting research to increase potash recoveries. 4

8. Maintaining a databank on current and developing mining technology. 9

9. Promote the development and demonstration of new equipment and systems relevant to all aspects of mining. 9

10. Develop and evaluate mineability and economic criteria for hardrock mining. 2

Contract Research

1. Provision of a JARCO 500 LHD diesel machine for underground environmental impact trials of emissions reduction devices (#4-9326). (CIL Inc., Burlington, Ontario) 5

2. Computer blast design program evaluation for large diameter blasthole stopes underground. (#5-7085). (Hycarb Engineering Limited, Calgary, Alberta 11, 7

3. Application of conventional mining techniques to underground oil sands mining (#4-9198). (Cominco Engineering Services Ltd., Calgary, Alberta) 4

4. Study of the constraints to technology development and application in the mining sector (#5-9170). (Bevelander and Company, Toronto, Ontario) 1

5. Develop a tailings management plan for acid-generating mine tailings in Canada (#4-9319). (Monenco Limited, Halifax, N.S.) 3

6. Microbiological control of leachings from mine tailings (#5-9156). (University of Ottawa, Ottawa, Ontario). 12

7. Consolidation of uranium mill tailings. (#5-1708) (Geocon Incorporated, Mississauga). 3

8. Compare numerical analysis of lab data on mine geometry to field data 10, 4

9. Hydrogeochemical investigation of reactive sulphide tailings at the Waite Amulet tailings site (#5-9120). (Noranda) 3

10. Production of portable microprocessor controlled in multisize range aerosol counting system (#4-9148). (Mono Research Labs Ltd) 11, 1

11. Development of a new semiconductor alpha portable detection system (#9-59092). (Thompson & Nielson) 11, 1

12. Radon gas fluxmeter (#6-9019). (Pylon Electronic Development) 11, 1

13. Examination of the 100% methanol or pilot diesel methanol engine as a power source for underground mines. 5, 11

14. Systems development & adaptation phase of CANMET diesel emissions reduction program (#5-9019). (Ontarion Research Foundation) 1

15. Determination of turbulence effects on the severity of dust-air explosions (#5-9080). (McGill University) 9, 11

16. Comparative study of 3 methods of reducing acid generation and metals release from waste rock (#5-9163). (Falconbridge Limited) 12, 3

Mineral Development Agreements

CANMET is the lead agency in Mineral Development Agreements, joint ventures of the Federal Government, mining companies and provincial governments, undertaken to support the mining industry. The agreements, supporting research and technology projects, acknowledge the importance of mining to the nation. A total of $5,213,000 has been committed in agreements with 4 provinces and negotiations are currently underway in other areas to work out the details of projects worth an approximately $1,000,000. All the committed money is to be spent over the next four years on projects to meet specific problems in mines in the various provinces and by the provinces government. $2,159,000 of the money is budgeted to be spent in the current fiscal year.

Ententes fédérale-provinciales

CANMET est le principal coordonateur des Ententes fédérale-provinciales, ces plans conjoints du Gouvernement fédéral, des compagnies minières et des gouvernements provinciaux, afin de rendre l'industrie minière plus compétitive. Les ententes, générant des projets de recherche et développement, reconnaissent l'importance des mines à l'échelle nationale. Un total de $5,213,000 a été octroyé dans 4 provinces et des négociations sont présentement en cours pour définir les détails de projets évalués approximativement à $1,000,000. Toutes les sommes accordées doivent être dépensées par les provinces au cours des quatre prochaines années sur des projets devant répondre à des problèmes spécifiques de leurs mines. Au cours de la présente année fiscale, $2,159,000 du budget doit être dépensé.

Ministry of Labour
Mining Health and Safety Branch
400 University Avenue, 7th Floor
TORONTO, Ontario
M7A 1T7

Mr. V. Pakalnis
Director
(416) 965-1328

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Evaluation of ultrasonic rockbolt tester.	10
2. Joint CANMET/MOL/Industry rockburst research program.	10
3. Evaluation of installed wire mesh screening.	10
4. Rockbolt testing and audits.	10
5. Wire rope technology.	10
6. Men and material hoisting.	9
7. Diesel emissions in underground mines.	5, 1

Natural Sciences and Engineering
Research Council of Canada (NSERC)
Communications Division (613) 996-6291
200 Kent Street
Ottawa, Ontario
K1A 1H5

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rotary engine developments.	5
2. Sensors for unmanned machining.	11

Centre de Recherches Minérales
Ministère de l'Énergie
et des Ressources
Complexe Scientifique
2700 rue Einstein
SAINTE-FOY, Québec
G1P 3W8

Dr. M. D. Everell
Directeur Général
(418) 643-4504

PROJECT TITLE / TITRE DU PROJET	CATEGORY / CATÉGORIE
1. Programme d'essais et de surveillance en chantier de la foreuse Roger.	7
2. Les propriétés physiques et mécanique des remblais souterrains et leur influence sur la conception des chantiers souterrains (M.J. Scoble McGill).	10, 4
3. Règle d'utilisation du boulonnage, Phase II	10
4. Étude de la relation de cause à effet de la prime au rendement sur la productivité et la rentabilité et la sécurité.	1
5. Implantation d'un système d'acquisition automatique de données par téléphone (SACATEL) à la JM Asbestos.	1
6. Conception des piliers de surface à la mine Chimo.	4
7. Accroissement de la productivité par l'amélioration du fonctionnement des équipements de hissage dans les mines souterraines.	9
8. Services techniques et études des machines d'extraction dans les mines souterraines du Québec (AMMQ).	9
9. Application de la géostatistique à un modèle tridimensionnel et son transfert technologique à l'UQAT.	3
10. Préparation d'un cahier d'ingénierie minière.	4

11.	Traduction des manuels no 4 et no 9 du Ontario Mining Health and Safety Training Program.	1
12.	Étude de la stabilité à la mine Niobec.	10
13.	Récupération des boues décantées dans des bassins d'argile.	3
14.	Stabilité des massifs rocheux à la mine Tio.	10
15.	Implantation des logiciels DISCODAT et CLINEX sur le système informatique de JM Asbestos.	11, 10
16.	Définition des besoins en planification minière chez JM Asbestos.	2
17.	Amélioration du sautage à la mine de Parent.	7
18.	Mise en opération de divers logiciels en ventilation minière.	11, 9
19.	Guide d'ingénierie pour la conception des piliers de surface.	10
20.	Assèchement de la fosse du Mont Wright.	3
21.	Développement d'un programme d'arpentage.	9
22.	Recherche d'un modèle de corrélation entre la minéralisation et la géologie du site New Pascalis Nord.	3
23.	Essais d'adhérence de câbles cimentés.	10
24.	Mise en place du logiciel PC-MINE au STM.	11
25.	Services techniques et études des machines d'extraction aux Ressources Minières Rouyn inc. (Division Lac Fortune).	9
26.	Logiciels de modélisation numérique pour le calcul des contraintes autour des excavations.	11, 10

27. Conception de patrons de sautage. 7

28. Implantation et essai d'un système de communication souterraine. 9

29. Algorithme d'estimation des réserves et teneurs conforme aux besoins de QCM. 3

30. Développement d'un système de planification par graphisme interactif à 3-D. 11, 4

31. Les carrières de granite. 1

32. Évaluation des niveaux de contrainte aux Mines Sigma. 10

33. Analyse de stabilité des talus. 10

34. Procédures de mesure des contraintes dans les massifs rocheux. 10

35. Les équipements miniers du Québec. 5

36. Programme Inclino. 11, 10

37. La restauration des parcs à résidus miniers. 3

38. Services techniques et études des machines d'extraction à Yorbeau Ressources inc. 9

39. Application des techniques microséismiques dans le suivi d'un pilier de surface. 10

SECTION TWO - Projects Listed by Categories

SECTION DEUX - Liste des Projets par Catégorie

INDEX CATEGORIES

1 MINE ADMINISTRATION: includes manpower training and development, safety, management organization, voice communication, data communication, remote monitoring or labour relations.

2 MINE FEASIBILITY: includes economic studies, mine evaluations, cost estimations and other projects undertaken to determine the potential success of major capital expenditures to develop a new mine, rehabilitate an old mine or expand an existing mine for increased production or better productivities.

3 SURFACE TECHNOLOGY: includes prospection, exploration, sampling, modelling, grade control, geostatistics, hydrology and geotechnology. It will also include projects dealing with environmental subjects, waste management, dewatering and other site work such as roads, bridges, dams and runways.

4 MINE DESIGN: includes selecting stope and pillar patterns and mining methods for new mines or for existing operations that are to be modernized or expanded.

5 EQUIPMENT: includes equipment design, selection and maintenance as well as installed and consumable supplies.

6 DEVELOPMENT: includes methods of advancing mine and stope access headings leading to the fragmentation and removal of the muck to the haulage system.

7 STOPING: includes operational topics such as fragmentation, blast pattern design, drilling methods, explosives and all other matters connected to preparing a block of ore, either a stope or a pillar, for drilling and blasting and removal of the fragments to the haulage system.

8 MATERIALS HANDLING: includes the movement of fragmented material, from stope or development heading, via loading/transportation systems, grizzlies, rock-breakers, ore passes, crushers, surge and storage bins and loading pockets to surface.

9 MINE SERVICES: include ventilation, compressed air, dewatering systems, air heating, hoisting plant (hoist, headframe, shaft conveyances and all shaft installations) and electrical supply, control and distribution and mine engineering geological control.

10 GROUND CONTROL: includes rock mechanic studies, ground support mechanisms and ground support preparation, placement and installation

11 HIGH TECH: includes computers, robotics, water jets or other new and innovative topics.

12 METAL RECOVERY: includes projects dealing with general milling operations, mill recoveries, reagent consumption as well as in-situ and heap leaching operations on surface or underground.

CATÉGORIES DU RÉPERTOIRE

1 ADMINISTRATION: Inclut l'entraînement du personnel, santé et sécurité, communications orales, transmission de données et relations de travail.

2 FAISABILITÉ: Comprend les études économiques, évaluation minière, estimation des coûts et autres projets entrepris afin de déterminer le succès potentiel d'un investissement majeur pour développer un nouveau gîte, réouvrir une ancienne mine ou l'expansion d'une mine déjà existante afin d'accroître la production ou la productivité.

3 TECHNOLOGIE DE SURFACE: Prospection, exploration, échantillonnage, modélisation, contrôle de la teneur, góstatistique, hydrologie et géotechnologie. Comprend également les projets touchant l'environnement, disposition des résidus miniers, drainage et autres travaux de surface tels: routes d'accès au site, ponts et digues.

4 CONCEPTION: Inclut la configuration des chantiers et piliers et les méthodes de minage pour des nouvelles mines ou pour des opérations à moderniser ou expansionner.

5 ÉQUIPEMENT: Inclut la conception, la sélection et l'entretien d'équipement mobile ou stationnaire et pièces.

6 DÉVELOPPEMENT: Méthodes de développer les accès dans la mine et aux chantiers, et moyens de briser et évacuer la roche dans le système de halage.

7 MINAGE: Inclut les opérations de minage telles: fragmentation, conception de patrons de sautage, méthodes de forage, explosifs et autres opérations reliées à la préparation d'un bloc de minerai pour forage, sautage et manutention du matériel dans le système de halage.

8 MANUTENTION DES MATÉRIAUX: Inclut le mouvement du roc fragmenté à partir des chantiers ou ouvrages de développement, via systèmes de transport/chargement, grizzlis, marteaux pneumatiques, cheminées à minerai, concasseurs, silos à minerai et points de soutirage jusqu'en surface.

9 SERVICES: Ventilation, air comprimé, système de drainage, chauffage de l'air, chambre de treuil (treuil, chevalement, installations du puits), système de distribution et contrôle électrique, ingénierie minière et contrôles géologiques.

10 SOUTÈNEMENT: Inclut études en mécanique des roches, soutènement minier, préparation au soutènement et installation du soutènement.

11 TECHNOLOGIE DE POINTE: Inclut l'utilisation des ordinateurs, la robotique ainsi que tout autre sujet d'innovation.

12 MINÉRALURGIE: Inclut traitement en général, récupération, teneur des concentrés, consommation de réactifs etc. Comprend également la lixiviation en place ou en tas à la surface ou en souterrain.

MINE ADMINISTRATION / ADMINISTRATION

PROJECT TITLE TITRE DU PROJET	PAGE
1. Determination of concentrations and size-fractionate airborne dust particles using area or personal sampling devices.	73
2. Measurement of the permeability of protective clothing and making recommendations for specific chemical-handling applications.	73
3. Size-fractionate counting and identification of biological contaminants, such as mould and bacteria, in the workplace atmosphere.	73
4. Provision of education workshops in chemical handling, industrial hygiene and toxicology.	73
5. Advice on correct respirator types. Assistance in respiratory projects, on program set-up and operations.	73
6. Recommendation of safe chemical handling practices.	73
7. Determination of gas concentrations on-site, using sensitive continuous monitoring techniques.	73
8. Examination of sulphide dust explosions in Canadian mines.	51
9. Development of new sampling strategies to improve the measurement of dust levels in asbestos mines.	51
10. Underground computer terminals for shift boss reporting.	8
11. Leaky cable underground communication system.	8
12. Develop a lift check device to lock scooptram dump and roll cylinders.	8
13. Introduction of fire resistant hydraulic fluids.	8

PROJECT TITLE / TITRE DU PROJET	PAGE
14. Promoting computer literacy/familiarity in all employees by providing them with no-interest loans for purchase of computers.	47
15. Self instructing teaching package for the design and application of perimeter blasting in open pit mines.	59
16. Certify flameproof equipment, gas detectors and fire-resistant materials used in explosive atmospheres.	90
17. Verifying proposed United Nations classification procedures for incorporation into the Explosives Act and Regulations.	91
18. Evaluate the quality and quantity of respirable dust produced in various mining activities.	90
19. Determine the magnitude and sources of noise and vibrations and monitoring techniques and identification of major sources of radiation and factors affecting the radiation release.	90
20. Confirm safety characteristics of all explosives; provide technical advice on explosive manufacture, storage and transport and investigate accidents.	90
21. Evaluate, in the lab, sensors for the continuous monitoring/detection of methane, diesel contaminant, ventilation and spontaneous combustion.	90
22. Demonstrate diesel emission control devices in both the lab and underground.	90
23. Systems development & adaptation phase of CANMET diesel emissions reduction program (#5-9019). (Ontarion Research Foundation)	92
24. Study of the constraints to technology development and application in the mining sector (#5-9170). (Bevelander and Company, Toronto, Ontario)	92

PROJECT TITLE TITRE DU PROJET	PAGE
25. Production of portable microprocessor controlled in multisize range aerosol counting system (#4-9148). (Mono Research Labs Ltd)	92
26. Development of a new semiconductor alpha portable detection system (#9-59092). (Thompson & Nielson)	92
27. Radon gas fluxmeter (#6-9019). (Pylon Electronic Development)	92
28. Direct data entry by front line supervisor.	33
29. Underground radio communications	33
30. Underground radio communications.	25
31. Phase II of a project to improve underground communication.	29
32. Development, and ultimately field testing, of a new concept for underground radio communications.	78
33. Development of a lighter and more protective workboot than previously available.	78
34. Development of a miner's worksuit, with a comfortable water-resistant fabric.	78
35. Development of a miner's air-flow helmet, featuring dust protection and incorporating a new lamp.	78
36. Experiences with a remote fly-in mining operation.	22
37. Diesel emissions in underground mines.	94
38. Modélisation de la productivité d'une machine seule, de l'interaction homme-machine et d'un système de machines.	63

PROJECT TITLE TITRE DU PROJET	PAGE
39. Influence de la prime au rendement sur les accidents du travail dans les mines souterraines du Québec.	68
40. Influence de diverses variables, dont la prime au rendement, sur la productivité minière souterraine au Québec.	68
41. Simulation of mine operating decisions.	65
42. Communication systems for underground workers.	39
43. Les carrières de granite.	98
44. Étude de la relation de cause à effet de la prime au rendement sur la productivité et la rentabilité et la sécurité.	96
45. Traduction des manuels no 4 et no 9 du Ontario Mining Health and Safety Training Program.	97
46. Implantation d'un système d'acquisition automatique de données par téléphone (SACATEL) à la JM Asbestos.	96
47. Influence des facteurs organisationnels sur la sécurité du travail.	84
48. Supervisory training.	84
49. Évaluation de la formation continue sur la sécurité en souterrain.	84
50. Influence de l'entraînement des mineurs lors de changement de tâche sur la prévention d'accidents.	84
51. Creation of an associate research commitee to maintain contacts with different research centres.	84
52. Relation between bonus and accident frequency.	84

PROJECT TITLE TITRE DU PROJET	PAGE
53. Impact de divers paramètres quantifiables sur la productivité en souterrain.	84
54. Procédures d'écaillage et analyse d'impact en prévention d'accidents.	84
55. Dust and fines generation in underground mining and ore handling.	19
56. Non destructive testing of hoist ropes.	19
57. Pay scheme, based on training and job rotation, of the man carrying the rate not the job.	50
58. Implementation of a mine wide bonus system based on operational performance including grades, metal prices, tons mined, costs, metal production, absenteeism and safety.	32
59. Developments in coal mine fire control.	87
60. Evaluation of an underground mine monitoring system.	87
61. Communication system for isolated areas in mines.	20
62. Conceptual design of a new method of achieving rigidity of ventilation duct after installation.	71
63. Modification des sièges et suspension sur les chargeuses-navettes et camions de halage pour prévenir les maux de dos.	42
64. Sulphide dust explosions: a fine particule approach.	57
65. Automated procedures for characterizing respirable dust.	58
66. Penetrating dust through respirators.	58
67. Analysis of the pollutants generated by the diesels in underground mines.	58

MINE FEASIBILITY / FAISABILITÉ

PROJECT TITLE TITRE DU PROJET	PAGE
1. Orebody evaluation - Pit optimization.	5
2. Computer program for estimating capital & operating costs.	52
3. Universal kriging applied to mineral commodity price forecasting.	53
4. Develop and evaluate mineability and economic criteria for hardrock mining.	91
5. Prévision des coûts de forage pour les exploitations minières souterraines.	63
6. Influence de diverses variables, dont la prime au rendement, sur la productivité minière souterraine au Québec.	68
7. Simulation of mine operating decisions.	65
8. Risk analysis in mining investments.	65
9. Development of micro computer software to evaluate new mine investment proposals.	65
10. Optimization of mine development and operating variables.	65
11. Time study regarding long hole drill.	43
12. Définition des besoins en planification minière chez JM Asbestos.	97
13. Estimating the capital and operating costs of mining small mineral deposits by underground methods.	81
14. Computer program for estimating operating costs for underground mines.	75

PROJECT TITLE TITRE DU PROJET	PAGE
15. A method and computer algorithm for isolation and calculation of the real rate of return.	57
16. Sélection des méthodes d'abattage en fonction de paramètres géologiques et économiques.	41

SURFACE TECHNOLOGY / TECHNOLOGIE DE SURFACE

PROJECT TITLE
TITRE DU PROJET | PAGE

1. Core sampler for oil sands and heavy oil formations. 54

2. Application of geostatistics to ore reserve estimations at the Venus Mine, Yukon Territory 53

3. Cone penetration test parameters to evaluate the stability of sand tailings impoundments. 53

4. Log-normal ore reserve calculations. 12

5. Methods to stabilize permafrost. 8

6. Lake dewatering 9

7. Overburden dewatering. 9

8. Tailing dam construction. 9

9. Overburden stabilization. 88

10. Developing methods to treat, dispose of and stabilize inactive tailings piles. 90

11. Develop new ore reserve evaluation methodologies and the ore reserves of specific mineral deposits. 91

12. Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high level radioactive waste containment. 91

13. Develop a tailings management program plan in relation to acid-generating mine tailings in Canada (#4-9319). (Monenco Limited, Halifax, N.S.) 92

PROJECT TITLE TITRE DU PROJET	PAGE
14. Hydrogeochemical investigation of reactive sulphide tailings at the Waite Amulet tailings site (#5-9120). (Noranda)	92
15. Consolidation of uranium mill tailings. (#5-1708) (Geocon Incorporated, Mississauga).	92
16. Comparative study of 3 methods of reducing acid generation and metals release from waste rock (#5-9163). (Falconbridge Limited)	93
17. Selection and development of a geotechnical database system for ore reserve calculations.	27
18. Processes for obtaining environmentally safe uranium mill tailings.	56
19. Étude de faisabilité d'un rideau d'étanchéité pour réduire les venues d'eau.	36
20. Plan de la nappe phréatique entourrant le gisement.	36
21. Modélisation géostatistique d'un gisement d'amiante.	36
22. Trous de drainage périphériques pour abaisser la nappe phréatique et installation de piézomètres.	45
23. Means of relating drill hole cuttings from each ore block to ore reactions in the mill, to improve the predictability of concentrate grades.	45
24. Algorithme d'estimation des réserves et teneurs conforme aux besoins de QCM.	98
25. Recherche d'un modèle de corrélation entre la minéralisation et la géologie du site New Pascalis Nord.	97
26. Application de la géostatistique à un modèle tridimensionnel et son transfert technologique à l'UQAT.	96

PROJECT TITLE
TITRE DU PROJET

PROJECT TITLE / TITRE DU PROJET	PAGE
27. Récupération des boues décantées dans des bassins d'argile.	97
28. Assèchement de la fosse du Mont Wright.	97
29. La restauration des parcs à résidus miniers.	98
30. Conduct subsidence studies in potash mining areas.	85
31. Salt tailings study (regarding backfill).	55
32. Pathways movements of brine from potash tailings piles.	19
33. N-81 grout curtain.	11
34. Geostatistical ore reserve modelling for diamond drill and blast hole drill assays with computer graphic and plotter displays	6
35. The application of geostatistics to the Sydney coal field	72
36. Ensemencement des haldes minières à l'aide des boues d'une usine d'épuration.	62
37. Mechanisms for detoxifying acid, metal-contaminated soils.	58
38. Nitrogen fixation and dynamics on revegetated land.	58
39. Vegetation dynamics on revegetated land.	58
40. Movement of Ra and other radioNuclides through terrestrial and aquatic ecosystems associated with uranium mine tailings, with special reference to mammals.	57
41. Metal tolerance of plants colonizing acid, metal-contaminated soils.	58

PROJECT TITLE TITRE DU PROJET	PAGE
42. Effects of revegetation practice on stream and groundwater chemistry.	58
43. Processing of mill tailings for disposal and for the recovery of valuable minerals by means offlocculation, carrier flotation and electroflotation.	57
44. Size characterization of asbestos fibers using light scattering techniques.	58

MINE DESIGN / CONCEPTION

PROJECT TITLE TITRE DU PROJET	PAGE
1. Design criteria for pillars in coal mines.	54
2. Application of rock mechanics methods for the design of underground mines.	52
3. Development of a rock mechanics model for potash.	52
4. Study of existing mine workings at the Ruttan Mine in order to define adequate criteria for the design of excavations.	52
5. Underground rock mechanics investigation at McLellan Mine.	52
6. Estimation of optimum stope span dimensions given its rock quality, stress configuration and excavation method and rate.	52
7. Underground computer assisted design.	88
8. Mining method selection, blast, design and layout for flat dipping ore-body.	15
9. Supporting research to increase potash recoveries.	91
10. Developing a handbook for the safe and economic design of surface crown pillars.	91
11. Application of conventional mining techniques to underground oil sands mining (#4-9198). (Cominco Engineering Services Ltd., Calgary, Alberta)	92
12. Compare numerical analysis of lab data on mine geometry to field data	91
13. Pillar recovery in blasthole stopes against consolidated hydraulic fills.	26
14. Computer aided design for optimum mine planning.	27

PROJECT TITLE TITRE DU PROJET	PAGE
15. Development of a 'timberless' undercut and fill mining method.	28
16. Long hole cut and fill	31
17. Optimisation des contours des exploitations à ciel ouvert.	63
18. Prévision des coûts de forage pour les exploitations minières souterraines.	63
19. Essais de poinçonnement des parois latérales des trous de sonde.	64
20. Adaptation de la technique du "Doorstopper" modifiée aux massifs de roches hétérogènes élastoviscoplastiques.	64
21. Évaluation du potentiel de coups de toît d'une mine.	64
22. Détermination des propriétés du sel gemme par essais dilatométriques.	64
23. Programme d'éléments finis pour la conception des mines.	64
24. Évaluation du potentiel du vérin Goodman dans les massifs élastoviscoplastiques.	64
25. Analyse de stabilité de piliers de surface.	64
26. Prévision des effets de l'utilisation des rejets de sel comme matériau de remblayage sur l'affaissement de surface des mines de sel domal.	64
27. Logiciel de calcul de contrainte dans les massifs rocheux fracturés.	68
28. Prévision de la rupture par basculement en stabilité des pentes.	68
29. Simulation de l'abattage par sous-niveaux	69

PROJECT TITLE
TITRE DU PROJET

PROJECT TITLE / TITRE DU PROJET	PAGE
30. Création d'une station CAO/FAO.	68
31. Development of a simulator to assess alternative mining strategy selection on ground control and economic performance.	65
32. Stability of gate roadways in underground coal mines.	66
33. Optimization of underground mine design.	66
34. Computerized open pit design.	66
35. Mesure des mouvements verticaux d'un banc par nivellement hydraulique.	36
36. Informatisation de la conception et planification.	36
37. Design de puits optimal et planification minière par micro-ordinateur.	37
38. Préparation d'un cahier d'ingénierie minière.	96
39. Conception des piliers de surface à la mine Chimo.	96
40. Les propriétés physiques et mécanique des remblais souterrains et leur influence sur la conception des chantiers souterrains	96
41. Développement d'un système de planification par graphisme interactif à 3-D.	98
42. Develop new mining methods with the main objectives of reducing or eliminating the cyclic elements of mining	85
43. Design of crown pillars.	84
44. Development of an underground mining approach for a very high grade uranium deposit.	13

PROJECT TITLE TITRE DU PROJET	PAGE
45. Input parameters for numerical modelling of potash strata	17
46. Changing to sub-level caving from long-hole stoping below the 3100 level.	32
47. Salt rock geomechanics for mine design.	61
48. Study of flow conditions arising in horizontal coarse slurry short distance pipelining.	74
49. Mechanics of interaction between pillar yield and roof sag.	57
50. Sélection des méthodes d'abattage en fonction de paramètres géologiques et économiques.	41
51. Dimensionnement de piliers et chantiers.	38

EQUIPMENT / ÉQUIPEMENT

PROJECT TITLE TITRE DU PROJET	PAGE
1. Determination of gas concentrations on-site, using sensitive continuous monitoring techniques.	73
2. Research on ceramic filters and their use underground to clean diesel exhaust.	51
3. Mise au point d'un système de télécommande en vue de l'opération de l'équipement minier souterrain sans visibilité du site de travail.	63
4. Automatisation de l'opération d'un brise-roches par rétroaction visuelle.	63
5. Trolley assist truck haulage.	10
6. Shovel payload weighing system.	10
7. Haulage truck fuel efficiency study.	10
8. Mechanical mining machines: shafts, raises, drifts.	8
9. Introduction of fire resistant hydraulic fluids.	8
10. Develop a lift check device to lock scooptram dump and roll cylinders.	8
11. Explosives customizing to give greater gap sensitivity and less power for perimeter blasting.	8
12. Cermet bit inserts for gauge buttons.	8
13. Field testing 4.5 inch and 3.5 inch in-the-hole up-hole drilling system.	8
14. Rubber truck box.	9

PROJECT TITLE TITRE DU PROJET	PAGE
15. Demonstrate diesel emission control devices in both the lab and underground.	90
16. Provision of a JARCO 500 LHD diesel machine for underground environmental impact trials of emissions reduction devices (#4-9326). (CIL Inc., Burlington, Ontario)	92
17. Examination of the 100% methanol or pilot diesel methanol engine as a power source for underground mines.	92
18. Continuing search for and development of low profile (6.5 feet) mining equipment.	23
19. Low profile two boom hydraulic drill jumbo's	33
20. Telescopic stoper leg for low stopes.	33
21. Low profile one boom jumbo for narrow development drifts	33
22. Backhoe to clean trackless drilling faces	33
23. Scoop modification for 6-way bulldozer blade	33
24. Evaluation of hydraulic rock bolt jumbos.	33
25. Pneumatic drill test for roof bolting.	33
26. Raise elevators	33
27. Trials with a mechanized scaling machine and a mechanized bolter/screener.	27
28. Improving hole accuracy of in-the-hole drilling through use of stabilizers and better machine alignment.	26

PROJECT TITLE TITRE DU PROJET	PAGE
29. Use of electric trucks for haulage.	26
30. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling.	26
31. Development of a tunnel boring machine for hardrock (HDRK project).	27
32. Mechanical scaling.	25
33. Studies pertaining to continuous mining, including the use of ore sorters in conjunction with continuous breakage of rock.	76
34. Loose rock sensing system for mechanized scaling.	29
35. Rotary engine developments.	95
36. 70 ton electric automated haulage truck.	28
37. Continuous mobile ore removal system.	28
38. Jointly developing, with Spar Aerospace, remote controlled underground equipment to screen and bolt in recently blasted areas.	28
39. Development of a miner's air-flow helmet, featuring dust protection and incorporating a new lamp.	78
40. Development and field testing of a 12-volt mini halogen cap lamp.	78
41. Remote scoop retrieval system.	31
42. Diesel emissions in underground mines.	94
43. Évaluation du potentiel du vérin Goodman dans les massifs élastoviscoplastiques.	64

PROJECT TITLE
TITRE DU PROJET | PAGE

44. Automated drill monitoring. 65

45. Machine à avance en continu (continuous miner). 43

46. Essai d'un système de chargement en vrac pour émulsions dans des trous de petit diamètre. 43

47. Fabrication d'un jumbo hydraulique électrique à petit diamètre ($1\frac{1}{2}$ à $1\frac{5}{8}$ ") à partir de composantes déjà existantes. 46

48. Évaluation d'une foreuse hydraulique diésel de surface. 46

49. Scaler machine in underground mine. 39

50. Tunnel boring machine. 39

51. Les équipements miniers du Québec. 98

52. Development of a continuous mining machine for hard rock formations. 85

53. Automated advance unit for continuous mining machines. 19

54. Non destructive testing of hoist ropes. 19

55. Development of tailings flinger. 19

56. Friction and wear: Evaluation of fire resistant hydraulic fluids. 19

57. Mining machine mounted analyzer for improved ore grade. 19

58. Optimized mineral extraction (OME) drop pipe development. 19

59. Alternative power systems for personnel transport underground. 19

PROJECT TITLE TITRE DU PROJET	PAGE
60. Winder-tensioner device for installing and tensioning hoist ropes.	81
61. Tunnel boring machine for boring tunnels of 2 m to 2.5 m in diameter.	81
62. Redpath/Robbins shaft boring machine for boring shafts of 6 m to 7.3 m in diameter.	81
63. Off-highway truck selection in surface coal mining.	87
64. Alternative face cutting systems for longwall mining.	87
65. A strategy for measuring off-highway rolling resistance.	87
66. Development and validation of the truck and shovel computer model.	87
67. Productivity and equipment selection in surface mining of oil sands.	87
68. Truck management systems review.	87
69. Development, construction and testing of prototype accessories for automation of DTH drills.	83
70. Determination of the technical viability of cavitating impact.	82
71. Conceptual design of new stoping method and mechanization of stoping operations.	71
72. Blasthole cleaning and dewatering apparatus.	71
73. Bavettes sur foreuses de 4.5 pouces de diamètre pour réduire le brouillard.	42
74. Modification des sièges et suspension sur les chargeuses-navettes et camions de halage pour prévenir les maux de dos.	42

PROJECT TITLE TITRE DU PROJET	PAGE
75. Programme d'entretien préventif de l'équipement diésel souterrain.	42
76. Chemo-abrasive water jet cutting of rocks.	58
77. Évaluation d'une mini chargeuse-navette électrique (80 cm de large).	41
78. Étude de faisabilité de télécommande sur Cavo 310 et 320.	34
79. Étude comparative des systèmes hydrauliques et pneumatiques s foreuse jumbo.	35

DEVELOPMENT / DÉVELOPPEMENT

PROJECT TITLE TITRE DU PROJET	PAGE
1. Tunnel simulation using micro computers.	52
2. Low profile one boom jumbo for narrow development drifts	33
3. Development of a tunnel boring machine for hardrock (HDRK project).	27
4. Studies to improve productivity in raise boring.	76
5. Ballistic "Hang-up" clearance system for ore passes and drawpoints.	29
6. Rock-support interaction studies.	66
7. Tunnel boring machine.	39
8. 10 foot diameter bored shaft with slip cast concrete lining.	11
9. Redpath/Robbins shaft boring machine for boring shafts of 6 m to 7.3 m in diameter.	81
10. Tunnel boring machine for boring tunnels of 2 m to 2.5 m in diameter.	81
11. Étude comparative des systèmes hydrauliques et pneumatiques s foreuse jumbo.	35

STOPING / MINAGE

PROJECT TITLE TITRE DU PROJET	PAGE
1. Mining 30 deg. dip orebodies with trackless equipment	12
2. Sub-level retreat mining with waste fill.	12
3. Continuing research on explosives and explosives technology.	8
4. Field testing 4.5 inch and 3.5 inch in-the-hole up-hole drilling system.	8
5. VCR ore extraction.	7
6. Optimization of blast design for blasthole mining operators.	16
7. V.B.M. design guidelines for steeply dipping orebodies and scaling techniques.	16
8. Tertiary recovery adjacent to unconsolidated backfill.	15
9. Implementing a modified cut and fill stoping method between the 850 and 1000 metre levels using remote controlled LHD's and filling stopes when emptied.	47
10. Self instructing teaching package for the design and application of perimeter blasting in open pit mines.	59
11. Fragmentation control through blasting.	59
12. Computer blast design program evaluation for large diameter blasthole stopes underground. (#5-7085). (Hycarb Engineering Limited, Calgary, Alberta	92
13. Development of a mining method for recovering pillars adjacent to delayed fill stopes.	23
14. Testing of 'double-decked' crater blasting.	28

PROJECT TITLE TITRE DU PROJET	PAGE
15. Rock mass classification.	28
16. Long hole cut and fill	31
17. Preshear blasting with large diameter holes.	22
18. Mining sequence and blasting for grade control purposes.	22
19. Computerized drill and blast optimization.	22
20. Perte de minerai et dilution par des stériles.	63
21. Modélisation CAO des méthodes d'abattage pour simuler dilution et pertes de minerai.	64
22. Étude du soutirage des blocs minéralisés aux niveaux 16 et de la mine Malartic pour Les Mines Camflo Ltée.	68
23. Optimisation du soutirage dans les chantiers miniers souterrains.	68
24. Ultrasonic surveying for improved drilling and blasting practices.	67
25. Blast fragmentation studies.	67
26. Étude de productivité des opérations d'une mine à ciel ouvert en fonction de la fragmentation du roc (et du coût des explosifs).	37
27. Optimisation des sautages primaires à l'aide d'un micro-ordinateur.	37
28. Programme d'essais et de surveillance en chantier de la foreuse Roger.	96
29. Amélioration du sautage à la mine de Parent.	97
30. Conception de patrons de sautage.	98

PROJECT TITLE TITRE DU PROJET	PAGE
31. Optimization of underground stope blast design.	85
32. Procédures d'écaillage et analyse d'impact en prévention d'accidents.	84
33. Replacing slurry explosives with an AN/FO and emulsion mixture for use in wet holes.	50
34. Use of large roadheader in room and pillar mining.	11
35. Changing to sub-level caving from long-hole stoping below the 3100 level.	32
36. Evaluation of propagation sensitivity of commercial explosives in 15 centimetre diameter holes.	79
37. Experimental verification of high velocity impact model for slurry explosives projectile impact.	79
38. Theoretical model for predicting low velocity impact sensitivity bubble of sensitized slurry explosion.	79
39. Computer blast design program evaluation for large diameter blasthole stopes.	79
40. Conceptual design of new stoping method and mechanization of stoping operations.	71
41. Assessment of the cuttability of hard rocks.	57
42. Characterization of rock drilling debris by acoustic emission analysis in order to monitor advance parameters.	58
43. Essai de dynamitage dans la zone S-3 en vue d'optimiser le patron.	41

TRANSPORTATION / MANUTENTION DES MATÉRIAUX

PROJECT TITLE
TITRE DU PROJET — PAGE

1. Analysis of in-pit crushing and conveying in open pit mines as alternative to conventional truck/ shovel system. 52

2. Tunnel simulation using micro computers. 52

3. Computer assisted truck dispatch. 10

4. Mining 30 deg. dip orebodies with trackless equipment 12

5. Testing load cells on underground trucks that will produce hard copy reports of each shifts performance. 47

6. Testing methods for mining, drying and conveying high grade fines recovered from sumps. 23

7. Backhoe to clean trackless drilling faces 33

8. Scoop modification for 6-way bulldozer blade 33

9. Deep level conveyor hoisting from several loading points with grizzlies and rock breakers 33

10. Containerized materials handling 33

11. Establishing a central control room at Strathcona for hoists and other materials handling functions. 27

12. Studies pertaining to continuous mining, including the use of ore sorters in conjunction with continuous breakage of rock. 76

13. Continuous mobile ore removal system. 28

14. Rock mass classification. 28

PROJECT TITLE TITRE DU PROJET	PAGE
15. High density fill.	28
16. Optimisation du soutirage dans les chantiers miniers souterrains.	68
17. A semi-automated truck dispatching system.	66
18. Simulation of underground haulage.	66
19. Élaboration d'un modèle de gestion des stocks de concentré boulettes au port.	45
20. Amélioration de la capacité de remblayage par addition d'un deuxième réservoir au moulin.	46
21. Dust and fines generation in underground mining and ore handling.	19
22. Development of tailings flinger.	19
23. Underground transport of tailings.	19
24. Use of large roadheader in room and pillar mining.	11
25. Selected a portable crusher for its low profile and compact arrangement for installation in a permanent underground crusher station.	30
26. Installing an automated cemented crushed rock backfill system for one man control and operation.	30
27. Study of flow conditions arising in horizontal coarse slurry short distance pipelining.	74
28. Détecteur de niveau de minerai dans les cheminées.	42
29. Évaluation d'une mini chargeuse-navette électrique (80 cm de large).	41

MINE SERVICES / SERVICES

PROJECT TITLE TITRE DU PROJET	PAGE
1. Vacuum enhanced drainage.	5
2. Development of new sampling strategies to improve the measurement of dust levels in asbestos mines.	51
3. Examination of sulphide dust explosions in Canadian mines.	51
4. Recirculation of mine ventilation in order to decrease heating costs.	51
5. Development of a file of mine planning computer models compatible with the IBM-PC.	51
6. Research on ceramic filters and their use underground to clean diesel exhaust.	51
7. Ventilation modelling to evaluate efficiency of present Nkana Division, Zambia, ventilation system and cooling practices.	51
8. Computerized mine maintenance.	10
9. Control of diesel emissions.	8
10. Mine air/waste waste heat recovery.	88
11. Initiating a 3 year program to increase computer usage for engineering planning, drawdown, ore scheduling, ventilation, reserves, grade control and ground control.	47
12. Assessing an underground communication system which combines monitoring functions with voice and data transmission.	47
13. Developing computer software for complete mine design and planning.	48
14. Testing plastic coated rub ropes in the service shaft.	48

PROJECT TITLE TITRE DU PROJET	PAGE
15. Testing a non-rotating balance rope with plastic filled valleys.	48
16. Designing a brine pumping system to handle the 6 to 10% moisture expected to drain from backfill.	48
17. Computer applications in underground mine design.	59
18. Fragmentation control through blasting.	59
19. Promote the development and demonstration of new equipment and systems relevant to all aspects of mining.	91
20. Maintaining a databank on current and developing mining technology.	91
21. Determination of turbulence effects on the severity of dust-air explosions (#5-9080). (McGill University)	93
22. Raise elevators	33
23. Evaluation of computerized survey calculations.	33
24. Inclinometer system for hydraulic drill jumbo drilling alignment	33
25. Establishing a central control room at Strathcona for hoists and other materials handling functions.	27
26. Application of a radio communication system (Montan Forschung) at Lockerby Mine.	27
27. Computerized surveying systems.	27
28. A mine lighting study to recommend types and spacing of lights for various underground mine situations.	77

PROJECT TITLE TITRE DU PROJET	PAGE
29. Maintenance of a ventilation advisory service to Ontario mines.	77
30. Consideration of the development and testing of a new concept for air-powered space lighting underground.	78
31. Development of a system for monitoring mine ventilation.	78
32. Men and material hoisting.	94
33. Les analyses par différentes méthodes pour le contrôle des teneurs de minerais.	70
34. Planification de la production des pelles par programmation non-linéaire.	63
35. Cédulation quotidienne des pelles à opérer par programmation linéaire.	63
36. Comparaison entre deux méthodes d'analyse informatisée des réseaux de ventilation, notamment la méthode conventionnelle et la méthode thermodynamique.	69
37. Remote surveillance of plant entrances.	36
38. Automatisation des contrôles de la ventilation et chauffage d'une mine souterraine.	37
39. Sous-programme d'ordinateur (intégré au programme actuel) pour suggérer au répartiteur la destination optimale d'un camion libre dans une mine à ciel ouvert.	37
40. Échangeur de chaleur entre l'entrée et la sortie de l'air de mine.	39
41. Simulation du réseau de ventilation sur micro-ordinateur.	39

PROJECT TITLE / TITRE DU PROJET	PAGE
42. Accroissement de la productivité par l'amélioration du fonctionnement des équipements de hissage dans les mines souterraines.	96
43. Implantation et essai d'un système de communication souterraine.	98
44. Services techniques et études des machines d'extraction aux Ressources Minières Rouyn inc. (Division Lac Fortune).	97
45. Développement d'un programme d'arpentage.	97
46. Services techniques et études des machines d'extraction à Yorbeau Ressources inc.	98
47. Services techniques et études des machines d'extraction dans les mines souterraines du Québec (AMMQ).	96
48. Mise en opération de divers logiciels en ventilation minière.	97
49. Mining machine mounted analyzer for improved ore grade.	19
50. Friction and wear: Evaluation of fire resistant hydraulic fluids.	19
51. Alternative mine air heating using waste heat.	19
52. Mined out potash room utilization.	19
53. Wall rock permeability study at PCS, Rocanville Division.	19
54. Optimized mineral extraction (OME) drop pipe development.	19
55. Alternative power systems for personnel transport underground.	19
56. N-81 grout curtain.	11

PROJECT TITLE / TITRE DU PROJET	PAGE
57. Install a second drive motor to the winze hoist.	32
58. Equip the No 2 Shaft hoist with a pinion brake.	32
59. Constructing an underground air receiver from a 460 foot exploration drift on the 3100 level.	32
60. Complete short term planning system	6
61. Interactive short to long term open pit computer planning system with full graphics	6
62. Commissioning a heat exchanger which will provide 25% of the energy needed to heat the 750,000 cfm mine ventilation air flow.	30
63. Evaluation of an underground mine monitoring system.	87
64. Communication system for isolated areas in mines.	20
65. Preparation of computer program specifications for the mining industry.	79
66. Blasthole cleaning and dewatering apparatus.	71
67. Conceptual design of a new method of achieving rigidity of ventilation duct after installation.	71
68. Programme d'entretien préventif de l'équipement diésel souterrain.	42
69. Entretien en continu des chemins et contrôle des venues d'eau au toît et dans le plancher.	42
70. Échantillonnage des boues de forage permettant une meilleure définition des teneurs dans les chantiers.	42

PROJECT TITLE TITRE DU PROJET	PAGE
71. Amélioration du système de lumières de circulation dans les rampes	42
72. Utilisation de laser pour arpentage en continu de longues galeries.	34
73. Système d'arpentage des trous de forage au diamant non sensible aux courants vagabonds.	34

GROUND CONTROL / SOUTÈNEMENT

PROJECT TITLE TITRE DU PROJET	PAGE
1. Outbursts in coal mines.	54
2. Shear failures during rockbursting.	52
3. Application of rock mechanics methods for the design of underground mines.	52
4. Study of existing mine workings at the Ruttan Mine in order to define adequate criteria for the design of excavations.	52
5. Development of a rock mechanics model for potash.	52
6. Underground rock mechanics investigation at McLellan Mine.	52
7. Pillar strengthening with grouted untesioned rebar or bolts.	51
8. Linkage algorithm for finite element/boundary integral methods for specific rock mechanics and underground mining applications.	51
9. Sub-level retreat mining with waste fill.	12
10. Explosives customizing to give greater gap sensitivity and less power for perimeter blasting.	8
11. Shotcrete cable bolts and applications	8
12. Tailings backfill dewatering.	7
13. V.B.M. design guidelines for steeply dipping orebodies and scaling techniques.	16
14. Development of a geomechanical data-base and numerical model for predicting ground behavior at depth.	16

PROJECT TITLE TITRE DU PROJET	PAGE
15. Delayed backfill consolidation.	15
16. Implementing a modified cut and fill stoping method between the 850 and 1000 metre levels using remote controlled LHD's and filling stopes when emptied.	47
17. Installing a backfill system to use 25% minus half inch quarried rock and 5% cement by weight.	47
18. Designing a brine pumping system to handle the 6 to 10% moisture expected to drain from backfill.	48
19. Use of backfill in potash mining (modelling).	48
20. Rock mechanics instrumentation for an underground potash mine utilizing backfilling operations.	48
21. Use of backfill in potash mining (laboratory and in-situ testing).	48
22. Sill pillar destressing.	21
23. Microseismic monitoring.	21
24. Precursor effects to rock failure.	59
25. Improvement of the suspended-load component of the layered mechanistic slurry pipeline model using data for Western Canada coals and materials suitable for mine backfilling	59
26. Boundary element method applied to underground stability analysis.	59
27. Rock burst investigations using concurrent tomographic imaging and acoustic emission techniques.	59

PROJECT TITLE / TITRE DU PROJET	PAGE
28. In-situ determination of dewatered fill properties.	24
29. Liquefaction potential of dense backfill	24
30. Developing rock bolting guidelines based on the latest technological data and analytical results.	91
31. Investigating mine stability and rock burst activity in mines and study the affect on computer models of alternate mine layout and extraction rates.	90
32. Carry out analytical numerical modelling studies as part of applied ground control investigations.	91
33. Compare numerical analysis of lab data on mine geometry to field data	92
34. Developing a handbook for the safe and economic design of surface crown pillars.	91
35. Use of consolidated fills for controlling violent pillar failures.	23
36. Pneumatic drill test for roof bolting.	33
37. Evaluation of hydraulic rock bolt jumbos.	33
38. Low profile roofbolting and screening platform	33
39. Rockburst studies at Strathcona Mine jointly with CANMET and the Ontario government with emphasis on fault slip behaviour.	26
40. Replacement of cement with slag. A plant is presently being set up at the Strathcona mill.	26
41. Improvement of fill placement techniques to reduce cement content, segregation and dilution during pillar recovery.	26

PROJECT TITLE TITRE DU PROJET	PAGE
42. Blast vibration monitoring in blasthole stopes when mining against backfill.	26
43. Use of paste fills and other high modulus fills, state-of-the-art studies in progress.	26
44. Use of microseismic monitoring at all the mines and linkage to a central control room for continuous monitoring on a 24-hour basis	26
45. Development of 2-D and 3-D numerical modelling programs using the Distinct Element approach.	26
46. Vacuum-blower unit.	25
47. Ground control research and testing.	25
48. Partial replacement of portland cement in backfill.	29
49. Microseismic monitoring.	28
50. Investigation of iron ore blast furnace slag as a binding agent for fills.	28
51. High density fill.	28
52. Development of a 3-D numerical modelling system for rock mechanics.	28
53. Hydraulic backfill.	31
54. Wire rope technology.	94
55. Rockbolt testing and audits.	94
56. Evaluation of installed wire mesh screening.	94

PROJECT TITLE
TITRE DU PROJET PAGE

57. Joint CANMET/MOL/Industry rockburst research program. 94

58. Evaluation of ultrasonic rockbolt tester. 94

59. Les expertises en géophysique appliquée et études séismiques. 70

60. Les études géotechniques de diverse natures sur les sols, les roches et les bétons. 70

61. Simulation de zones de cisaillement par méthode statistique, éléments finis et modèle physique. 70

62. Analyse de stabilité de piliers de surface. 64

63. Effet de l'historique de chargement avec la méthode convergence-confinement. 64

64. Prévision des effets de l'utilisation des rejets de sel comme matériau de remblayage sur l'affaissement de surface des mines de sel domal. 64

65. Guidelines for the use of rockbolting. 68

66. Dimensionnement des revêtements de béton des galeries souterraines. 68

67. Back analysis of a major underground ground failure. 68

68. Mesure de la tension dans les câbles d'ancrage 68

69. Logiciel de calcul de contrainte dans les massifs rocheux fracturés. 68

70. Prévision de la rupture par basculement en stabilité des pentes. 68

71. De-stress blasting design. 65

PROJECT TITLE TITRE DU PROJET	PAGE
72. Mine backfill design and performance.	65
73. Stability of gate roadways in underground coal mines.	66
74. Rock-support interaction studies.	66
75. Development of new pack material for coal mines.	66
76. Paste backfill characteristics.	66
77. Acoustic emission technology applied to mining.	66
78. Swellex bolts.	43
79. Évaluation et utilisation du système de laçage par câble (cable lacing) comme alternative au support par cadres d'acier.	43
80. Installation and evaluation of 20 foot stressed cable bolts in pre-sheared pit walls.	36
81. Rock bolting open pit walls.	36
82. Rock mechanics computer simulation model.	40
83. In situ stress measurement in 1305-W drift.	46
84. Addition de cendres (fly ash) au remblai pour réduire la proportion de ciment.	39
85. Adhesion of floculant in mining backfill.	39
86. Procédures de mesure des contraintes dans les massifs rocheux.	98
87. Application des techniques microséismiques dans le suivi d'un pilier de surface.	98

PROJECT TITLE TITRE DU PROJET	PAGE
88. Évaluation des niveaux de contrainte aux Mines Sigma.	98
89. Stabilité des massifs rocheux à la mine Tio.	97
90. Essais d'adhérence de câbles cimentés.	97
91. Étude de la stabilité à la mine Niobec.	97
92. Règle d'utilisation du boulonnage, Phase II	96
93. Guide d'ingénierie pour la conception des piliers de surface.	97
94. Analyse de stabilité des talus.	98
95. Les propriétés physiques et mécanique des remblais souterrains et leur influence sur la conception des chantiers souterrains.	96
96. Implantation des logiciels DISCODAT et CLINEX sur le système informatique de JM Asbestos.	97
97. Programme Inclino.	98
98. Logiciels de modélisation numérique pour le calcul des contraintes autour des excavations.	97
99. Conduct subsidence studies in potash mining areas.	85
100. Development of a rock mechanics ground control field data base for use in mine design and modelling techniques.	85
101. Backfill studies of potash mines.	85
102. Final stage of the development and testing of an ultra sonic survey probe for determining the contours of inaccessible open stopes or other mine openings.	85

PROJECT TITLE / TITRE DU PROJET	PAGE
103. Develop numerical modelling for mine design; primarily finite element methods and boundary element techniques will be used.	86
104. Procédures de boulonnage.	84
105. A field test program to evaluate the use of waste salt backfill in Saskatchewan potash mines.	18
106. Natural and induced seismicity in Saskatchewan.	55
107. Rock bolter for the PCS, Lanigan Division.	19
108. Development of a prototype microseismic monitoring system.	19
109. Large sample triaxial test facility.	89
110. Potash rock mechanics instrumentation.	89
111. Study of overburden movement and pillar behavior in extracted areas.	17
112. Seismic monitoring.	17
113. Input parameters for numerical modelling of potash strata	17
114. Computerized radio telemetry slope monitoring system for strain gauges and extensometer monitoring	6
115. Computerized survey slope monitoring system for transit/EDM	6
116. Behaviour of halite tailings as backfill	61
117. Digital photoanalysis of rock jointing.	61
118. The effectiveness of mine backfill in alleviating rockburst phenomena	60

PROJECT TITLE TITRE DU PROJET	PAGE
119. Testing a 3% cement and 2% flyash mix to bind a minus 5 inch crushed rock backfill.	30
120. Installing an automated cemented crushed rock backfill system for one man control and operation.	30
121. A suggested method for estimating bolt lengths and loadings for support of rectangular openings.	87
122. Ground stability evaluation with reference to an en echelon orebody.	20
123. Field and laboratory testing, field measurements and numerical modelling of excavations in potash.	14
124. Sampling, field testing and modelling Les Mines Selbaie surface crown pillar.	80
125. Investigation into cementatious properties of lead blast furnace slag.	71
126. Evaluation of grout filled lightweight tubular steel as an alternative to conventional steel supports in mines.	71
127. Conceptual design of rock stabilizer and outline of testing procedure.	71
128. Classification of mine workings according to their rockburst proneness.	57
129. Establishment of lighting standards and measuring techniques as they relate to ground control and emergency preparedness.	57
130. Numerical modelling of radiation damping in the dynamic analysis of stresses around underground openings by using the finite element method.	57
131. A study of crack propagation in homogeneous and heterogeneous media - the fractal structure of porous bodies.	58

HIGH TECH / TECHNOLOGIE DE POINTE

PROJECT TITLE TITRE DU PROJET	PAGE
1. Telerobot interfaces for machines operation.	52
2. Ventilation modelling to evaluate efficiency of present Nkana Division, Zambia, ventilation system and cooling practices.	51
3. Computer assisted truck dispatch.	10
4. Computerized mine maintenance.	10
5. Mise au point d'un système de télécommande en vue de l'opération de l'équipement minier souterrain sans visibilité du site de travail.	63
6. Automatisation de l'opération d'un brise-roches par rétroaction visuelle.	63
7. Cermet bit inserts for gauge buttons.	8
8. Underground computer assisted design.	88
9. Mining recording computerization.	88
10. Mine design CADD system.	15
11. Promoting computer literacy/familiarity in all employees by providing them with no-interest loans for purchase of computers.	47
12. Testing load cells on underground trucks that will produce hard copy reports of each shifts performance.	47
13. Microseismic monitoring.	21
14. Improvement of the suspended-load component of the layered mechanistic slurry pipeline model using data for Western Canada coals and materials suitable for mine backfilling	59

PROJECT TITLE TITRE DU PROJET	PAGE
15. Computer applications in underground mine design.	59
16. Rock burst investigations using concurrent tomographic imaging and acoustic emission techniques.	59
17. Carry out analytical numerical modelling studies as part of applied ground control investigations.	91
18. Testing a side-viewing television camera for use in small diameter drill holes.	91
19. Examination of the 100% methanol or pilot diesel methanol engine as a power source for underground mines.	92
20. Determination of turbulence effects on the severity of dust-air explosions (#5-9080). (McGill University)	93
21. Radon gas fluxmeter (#6-9019). (Pylon Electronic Development)	92
22. Production of portable microprocessor controlled in multisize range aerosol counting system (#4-9148). (Mono Research Labs Ltd)	92
23. Development of a new semiconductor alpha portable detection system (#9-59092). (Thompson & Nielson)	92
24. Computer blast design program evaluation for large diameter blasthole stopes underground. (#5-7085). (Hycarb Engineering Limited, Calgary, Alberta	92
25. Direct data entry by front line supervisor.	33
26. Underground radio communications	33
27. Evaluation of computerized survey calculations.	33

PROJECT TITLE TITRE DU PROJET	PAGE
28. Inclinometer system for hydraulic drill jumbo drilling alignment	33
29. Selection and development of a geotechnical database system for ore reserve calculations.	27
30. Computer aided design for optimum mine planning.	27
31. Computerized surveying systems.	27
32. Use of paste fills and other high modulus fills, state-of-the-art studies in progress.	26
33. Use of microseismic monitoring at all the mines and linkage to a central controlroom for continuous monitoring on a 24-hour basis.	26
34. Development of 2-D and 3-D numerical modelling programs using the Distinct Element approach.	26
35. State-of-the-art study on electronics in mining (HDRK project).	27
36. Development of technologies, techniques and equipment for the cutting of hardrock, utilizing high pressure water jets with other relevant devices.	76
37. Two studies for using water under pressure for mining applications: one for cutting and slotting and one for secondary breakage.	29
38. Sensors for unmanned machining.	95
39. Jointly developing, with Spar Aerospace, remote controlled underground equipment to screen and bolt in recently blasted areas.	28
40. Development of a 3-D numerical modelling system for rock mechanics.	28
41. Computerized drill and blast optimization.	22

PROJECT TITLE TITRE DU PROJET	PAGE

42. Low frequency cavitation processing. 56

43. Sub surface radar data analysis. 56

44. Modélisation CAO des méthodes d'abattage pour simuler dilution et pertes de minerai. 64

45. Simulation de l'abattage par sous-niveaux 69

46. Création d'une station CAO/FAO. 68

47. Development of a simulator to assess alternative mining strategy selection on ground control and economic performance. 65

48. Automated drill monitoring. 65

49. Acoustic emission technology applied to mining. 66

50. Optimization of underground mine design. 66

51. Computerized open pit design. 66

52. Simulation of underground haulage. 66

53. A semi-automated truck dispatching system. 66

54. Risk analysis in mining investments. 65

55. Optimization of mine development and operating variables. 65

56. Development of micro computer software to evaluate new mine investment proposals. 65

57. Informatisation de la conception et planification. 36

PROJECT TITLE
TITRE DU PROJET

PROJECT TITLE / TITRE DU PROJET	PAGE
58. Automatisation de la lecture des inclinomètres.	36
59. Remote surveillance of the central air and steam plant operation.	36
60. Méthode statistique de contrôle de procédés.	36
61. Remote control of primary crusher operation.	36
62. Robotisation de l'empilage des sacs d'amiante.	37
63. Étude de contrôle des ensacheuses par ordinateur.	37
64. Automatisation des contrôles de la ventilation et chauffage d'une mine souterraine.	37
65. Sous-programme d'ordinateur (intégré au programme actuel) pour suggérer au répartiteur la destination optimale d'un camion libre dans une mine à ciel ouvert.	37
66. Design de puits optimal et planification minière par micro-ordinateur.	37
67. Computerized system to improve concentrate feed blending (developed at McMaster University).	45
68. Rock mechanics computer simulation model.	40
69. Purchase of computer equipment as well as consistent software in mining.	46
70. Adhesion of floculant in mining backfill.	39
71. Simulation du réseau de ventilation sur micro-ordinateur.	39
72. Mise en place du logiciel PC-MINE au STM.	97

PROJECT TITLE TITRE DU PROJET	PAGE
73. Développement d'un système de planification par graphisme interactif à 3-D.	98
74. Mise en opération de divers logiciels en ventilation minière.	97
75. Implantation des logiciels DISCODAT et CLINEX sur le système informatique de JM Asbestos.	97
76. Logiciels de modélisation numérique pour le calcul des contraintes autour des excavations.	97
77. Programme Inclino.	98
78. Develop new mining methods with the main objectives of reducing or eliminating the cyclic elements of mining	85
79. Develop numerical modelling for mine design; primarily finite element methods and boundary element techniques will be used.	86
80. Final stage of the development and testing of an ultra sonic survey probe for determining the contours of inaccessible open stopes or other mine openings.	85
81. Prefeasibility study for the replacement of diesel fuel by hydrogen fuel in underground equipment.	86
82. Development of novel Ground monitoring instrumentation: i) Recoverable Stressmeter, ii) Holographic stressmeter, iii) Closure meter.	85
83. Construction of state-of-the-art microseismic system.	85
84. Develop additional software modules to increase the usefulness of the "Computer-Aided Mine Design Layout System".	85

PROJECT TITLE TITRE DU PROJET	PAGE
85. Development of a continuous mining machine for hard rock formations.	85
86. Microcomputer applications study.	55
87. Ore cutting technology.	19
88. Total station survey instruments interfaced with a computer system.	11
89. Adaptive control of robots vision for robots.	61
90. Digital photoanalysis of rock jointing.	61
91. Theoretical model for predicting low velocity impact sensitivity bubble of sensitized slurry explosion.	79
92. Computer blast design program evaluation for large diameter blasthole stopes.	79
93. Preparation of computer program specifications for the mining industry.	79
94. Development, construction and testing of prototype accessories for automation of DTH drills.	83
95. Determination of the technical viability of cavitating impact.	82
96. Optimisation des circuits de production de la fibre d'amiante.	62
97. Numerical modelling of radiation damping in the dynamic analysis of stresses around underground openings by using the finite element method.	57
98. Characterization of rock drilling debris by acoustic emission analysis in order to monitor advance parameters.	58
99. Fragmentation of Sudbury hardrock by sonic and ultrasonic resonances.	58
100. Chemo-abrasive water jet cutting of rocks.	58

METAL RECOVERY / MINÉRALURGIE

PROJECT TITLE
TITRE DU PROJET PAGE

1. Development of bacterial leaching pretreatment process for refractory gold ores and concentrates. 73

2. Recovery of gold from pyritic and arsenopyritic tailings. 73

3. Coal blending computer model for improved mine planning. 51

4. Rock grinding index. 10

5. Scalping/Screening of mill feed. 10

6. Heap leaching - Solvent extraction 9

7. Secondary recovery of base metals by in place bacterial leaching. 88

8. Bacterial-Leach assisted mining. 15

9. Microbiological control of leachings from mine tailings (#5-9156). (University of Ottawa, Ottawa, Ontario). 92

10. Comparative study of 3 methods of reducing acid generation and metals release from waste rock (#5-9163). (Falconbridge Limited) 93

11. Program of large-scale underground testing of heap leaching. 23

12. Processes for obtaining environmentally safe uranium mill tailings. 56

13. Quantification of mineral liberation using automated image analysis. 66

14. Program to eliminate product contamination by improved housekeeping practices. 36

15. Étude statistique du contrôle de qualité. 36

PROJECT TITLE TITRE DU PROJET	PAGE
16. Programmable controller for packaging operation.	36
17. Méthode statistique de contrôle de procédés.	36
18. Remote control of primary crusher operation.	36
19. On stream iron analysis.	45
20. Computerized system to improve concentrate feed blending (developed at McMaster University).	45
21. Study of the in-situ mining of copper oxide ore by leaching methods.	85
22. Clay sorting technology for ores with high insolubles content.	19
23. Heap leaching gold processing successfully demonstrated and proceeding to expand to test full scale operation.	49
24. A study of pyrite liberation, of Prince Coal, by grinding in closed circuit with a classifier.	71
25. Treatment of Pine Brook barite to obtain mud grade barite concentrate.	71
26. Preliminary investigation of upgrading Nova Scotia oil shale.	72
27. Optimisation des circuits de production de la fibre d'amiante.	62
28. Studies of the bacterium thiobacillus ferrooxidans with regard to the bioleaching of uranium ores.	57
29. Processing of mill tailings for disposal and for the recovery of valuable minerals by means offlocculation, carrier flotation and electroflotation.	57
30. Échantillonneur systématique pour le minerai concassé à l décharge du concasseur secondaire.	44

Any comments about this document sent in by readers will be appreciated and will be examined prior to compiling future issues. However there is one item about which CANMET would like to have comments. That item relates to a suggestion put forward by several mine operators that the "Index" contain a section dealing with completed projects; specifically how well projects met their original objectives. How much interest is there in such information and how willing would you be about participating?

Comments:

Return to: Mining Research Laboratories
CANMET, EMR
555 Booth Street
Ottawa, Ontario
K1A 0G1

Attention R. Clarke

Tout commentaire au sujet du présent répertoire sera considéré lors des publications ultérieures. Un point sur lequel CANMET aimerait particulièrement avoir votre opinion concerne une suggestion faite par plusieurs entreprises minières: il s'agit d'une sectio:. du répertoire qui contiendrait des informations sur les projets complétés, ainsi que les résultats du projet par rapport aux bénifices escomptés. Quel est votre intérêt envers ce type d'information? Seriez vous prêts à nous fournir de tels renseignements?

Commentaires:

Retournez à Laboratoires de recherche minière
CANMET, EMR
555 rue Booth
Ottawa, Ontario
K1A 0G1

Aux soins de: R. Clarke

PROJECT INFORMATION/INFORMATION SUR LE PROJET

Name/Nom:

Title/Titre:

Organization/Organisation:

Address/Adresse:

Telephone/Téléphone:

Project Categories/Catégories du projet

1	Mine Administration Administration	2	Mine Feasibility Faisabilité	3	Surface Technology Technologie de surface
4	Mine Design Conception	5	Equipment Équipement	6	Development Développement
7	Stoping Minage	8	Materials Handling Manutention des matériaux	9	Mine Services Services
10	Ground Control Soutènement	11	High Tech Technologie de pointe	12	Metal Recovery Minéralurgie

Project Description/Résumé du projet

Return to/Retournez à: CANMET
555 rue Booth St
Ottawa, Ontario
K1A 0G1

Attention/Au soin de: R.W.D. Clarke